2018 THIRD-PARTY LOGISTICS STUDY

The State of Logistics Outsourcing

Results and Findings of the 22nd Annual Study

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Supporting Organizations:

EXECUTIVE SUMMARY

Current State of the 3PL Market

The 2018 *22nd Annual Third-Party Logistics Study* shows the continuation of positive relationships between shippers and third-party logistics providers. Greater availability of data and the ability to make real-time decisions are driving both parties towards more meaningful partnerships, which is leading to innovative solutions that can provide a competitive advantage for shippers.

Among respondents of the 2018 study, 73% of 3PL users and 92% of 3PL providers agree that 3PLs provide new and innovative ways to improve logistics effectiveness, and 81% of 3PL users (shippers) and 98% of 3PL providers agree that the use of 3PLs has contributed to improving services to the ultimate customers.

This year's study showed the need for and the importance of openness and transparent and effective communication between 3PLs and shippers, and 39% of 3PL users and 81% of 3PL providers agree that collaborating with other companies, even competitors, can achieve logistics cost and service improvements.

There has been a continuation of the most frequently outsourced activities, which tend to be those that are more transactional, operational and repetitive. Interestingly, the percentage of users indicating the outsourcing of information technology services increased to 27% in the 2018 study from 17% in the previous year. This comes at the same time as the 'IT Gap' has grown slightly, with the percentage of shippers indicating satisfaction dropping to 56% this year from 65% last year. However, it has become very clear that there is significant demand among shippers in general to look to their 3PLs as a source of needed IT technologies.

Respondents reinforced that supply chain operations continue to provide a competitive advantage to shippers and can be a key differentiator between businesses in all sectors. This year's study shows that shippers are relying on their 3PL partners for a broad range of logistics and supply chain services, and that some of these are exhibiting growth over time.

Blockchain for Supply Chain

The increased desire for visibility within the supply chain is driving increased interest in blockchain technology, which breaks each movement down into a block and documents transactions every time a shipment changes hands. Linking the blocks together creates a record of the parties involved in the process and provides specific details associated with each movement, which all parties can access.

The technology improves security because each transaction is validated and recorded by an independent third party. No one party can modify, delete or append any record without a validation of the edit from others in the network. The goal is to create one version of the truth, link information and create transparency.

By using blockchain, 3PLs and shippers could drive additional value from the supply chain. Data generated through blockchain technology could provide more opportunity to analyze information, which is becoming more important in today's data-driven supply chain. Because blockchain closely tracks and transmits timely data and creates transparency upstream and downstream, retailers can closely monitor inventory levels, which could lead to dynamic supply chains.

Blockchain could create challenges, including the development and governance of blockchain data sharing. Because blockchain creates a centralized, accessible ledger, there needs to be interoperability across private and public blockchains, which will require standards and agreement. There are also expenses associated with blockchain, and shippers will need to derive clear value from the technology. Currently there doesn't appear to be an easily defined value proposition for all products, requiring shippers to spend time determining the benefit for their products and business environment.

The study found that both 3PLs and shippers are in the beginning states of examining or implementing blockchain technology, and because of its nascent stage, the blockchain ecosystem needs further development. However, interest is increasing, particularly for logistics providers and its use could create a competitive advantage.

Automation/Digitization in the Supply Chain

Automation and digitization within the supply chain is driving change in two areas—the ways in which data is collected and utilized as well as technological advances on equipment used to transport goods, such as Class 8 trucks.

Shippers and 3PLs are collecting, transmitting and analyzing increased amounts of information, and data-driven decision making is the key to increase asset utilization, improve efficiency and decrease volatility. Shippers and 3PLs are leveraging advanced technologies to enable faster and more efficient services, provide visibility and improve safety.

Survey respondents reported that big data shows the most potential within the supply chain, with large numbers of both shippers

and 3PLs saying they plan to make future investments in the capability.

The amount of technology used on Class 8 trucks has also increased, and it has the potential to aid in data collection, improve safety and limit the impact of human error in transportation.

Technologies already available include adaptive cruise control with braking, lane departure warnings, collision-mitigation systems, right-side object detection sensors, electronic stability control and telematics devices. Technologies currently in development include self-driving trucks, truck platooning, traffic jam assist and auto docking.

Rapidly changing technology has both benefits and challenges. While the large number of companies competing in the space may drive costs down, it could also threaten the continuity of service as players drop out. It could lead to a potential struggle to build a comprehensive adoption strategy as technology changes over time. The rapid progress also means today's technologies may be obsolete next year as new players rise and fall in the digital space, which could make some shippers and 3PLs hesitant to invest in certain technologies.

Risk/Resilience in Shipper-3PL Relationships

Increased visibility within the supply chain is creating more opportunities for 3PLs to provide greater value, and providers are becoming better prepared to deal with potential uncertainties and problems before they occur.

Both parties increasingly need the resources required to enhance their abilities to take action in real-time, lessening or mitigating the consequences of supply chain disruptions, and real-time problems depend on real-time solutions.

In this year's study, 98% of shippers and 99% of 3PLs agreed that there is an increased need for 3PLs to respond to customers more quickly and with complete, accurate and consistent information. However, both parties agree there is a need for improvement, with just over half of shippers—51%—and half of 3PLs reporting that 3PLs communicate well in responding to risks and executing operating objectives.

Risk, resilience and recovery are the three key elements of the continuous cycle that help those within the supply chain understand, quantify, mitigate or eliminate, and then recover from certain types of risk.

Successful relationships often include processes for solution design and delivery, timely protocols to resolve problems, reduced cycle times and process variability, and effective communication using state-of-the-art capabilities. Results from this year's study shows that the parties may have different thoughts about the role each is to play. What's more, a larger percentage of shippers see the need for pursuing areas for improvement related to risk and resilience.

Some of the challenges include high workloads, lack of time and/or detail to respond properly, a lack of experienced and capable talent, the need for clear understanding of risks, and a sense of urgency and cost maintenance.

Going forward, it may be necessary to remove the silos that exist between functions and process areas within the organization, which would provide greater flexibility and responsiveness to deal with problems as they emerge.

Logistics Talent Revolution

Technology is reframing the demands on the workforce, particularly within the supply chain where automation, digitization and data collection capabilities are growing rapidly. Supply chain leaders and logistics executives are taking on even greater importance as companies work to build more efficient and technologically advanced supply chains.

Although it may seem like increased automation will decrease the need for companies to invest in employees, the opposite is true. Technology will help employees recognize greater potential and address certain tasks so that talent can push further, but it is human talent that is the key factor in defining and applying innovation.

Supply chain and logistics executives are increasingly shifting from physical efficiency to data efficiency. Shippers and logistics providers are increasingly using data to drive both real-time and long-term decisions, and supply chain professionals have to interpret insights from the faintest of signals. In addition, supply chain leaders must understand all aspects of an end-to-end supply chain, and adapt as technology creates new opportunities.

Like technology, supply chains and business environments are constantly in flux, and leaders will have new skills to master and systems to learn throughout their careers, which means future industry leaders will have to be agile. They will also have to serve as a visionary and strategist to be successful in embracing change.

Understanding the current and future state of the supply chain industry will help shippers and 3PLs align a company's business and talent strategy and then map the workforce's needs to that strategy.

CURRENT STATE OF THE 3PL MARKET

Shipper Demands, Customer Expectations and 3PL Capabilities Increase, Putting Supply Chain at the Forefront

Time-sensitive deliveries, lean inventories and shorter product lifecycles are placing greater demands on the supply chain. Shippers have greater expectations of what they want their logistics providers to accomplish, and the proper alignment of those expectations is the key to guaranteeing success between both parties. The *22nd Annual Third-Party Logistics Study* shows shippers are continuing to collaborate with 3PLs to strengthen their relationships and optimize the supply chain.

In today's marketplace, customers of all types are better informed and expectations are increasingly set higher. The growth of e-commerce, increased consumer demands and the speed at which new technologies enter the market makes the supply chain more relevant. This comes as demand patterns are shifting and new competitors are entering the marketplace, challenging established business models.

Conversations surrounding supply chain have made their way into the boardroom and an effective supply chain can be a key differentiator between businesses in all sectors.

"Supply chain used to be a function. Now it is a value-add, and it is fundamental to your customer's experience," said Kim Breland, director of finance, supply chain operations for Sprouts Farmers Market, a supermarket chain based in Phoenix. "It has gone from a box hitting a location to delivering an outcome."

Breland was among several logistics executives who took part in the study's workshop held at Google headquarters in Mountain View, California.

Total logistics expenditures as a percentage of sales revenues has increased, reaching 11% in the current year's study from 10% in the previous year. Over the same time frames, the percentage of shippers' transportation spend managed by 3PLs increased to 55% from 53%, while the percentage of shippers' warehousing spend managed by 3PLs decreased slightly to 39% from 40%.

The functioning of today's supply chains relies significantly on the abilities of all involved parties to have access to vast amounts of data in near real-time or, increasingly, real-time. This allows them to make decisions earlier, and as a result, shippers and 3PLs are moving away from transactional relationships and toward meaningful partnerships. Those pairings lead to innovative solutions that improve the end-user experience for customers and create a true competitive advantage for shippers and their 3PL providers.

For more than 20 years, the *Annual 3PL Study* has found that shippers increasingly leverage what 3PLs offer, maximizing the supply chain, driving out costs and creating value. This year, the number of shippers reporting that 3PLs helped them lower costs has increased, as has the number of shippers reporting that 3PLs have contributed to improving services to the ultimate customer.

The results and findings of the 2018 *22nd Annual Third-Party Logistics Study* provide current perspectives on the nature of shipper and 3PL relationships, why they are generally successful and some of the ways in which they could be improved.

The current retail landscape is evolving rapidly, and e-commerce is disrupting the traditional retail world. Technology is making it easier for consumers to make purchases, sometimes with a single keystroke, and more retailers are offering one-hour, same-day or next-day deliveries. Amazon, big-box retailers and grocers are investing in omni-channel network capabilities that are allowing them to capitalize on consumer demand for even greater speeds and ease.

In today's environment, shopping is no longer defined as someone getting in a car and driving to a store. The transaction becomes an ambient activity that is executed anywhere at any time.

Increased package volumes are driving changes in distribution networks, and last-mile capabilities are essential to the rapid deliveries consumers and shippers expect. Shippers are looking for enhanced fulfillment capabilities, efficient supply chains and data that can help them improve operations. At the same time, shippers are exhibiting a greater understanding of their organizations' core businesses, and they understand that improved supply chain capabilities can help to achieve overall organizational objectives.

For several years, the study has seen shippers refocusing efforts on their core strengths to stay competitive, which often leads to greater reliance on third-party logistics providers. This demonstrates that shippers are becoming more secure with their partnerships and value the reliability that 3PLs can provide.

Supply chain activity is accelerating, and shippers have improved upon their ability to determine when and why investing in third-party logistics services can be useful and how best to work with commercial providers to create the best results for their organizations and their supply chains. The 2018 study confirms these observations given that a high percentages of 3PLs and shippers view their relationships as successful.

As always, developments within the supply chain industry are tempered by the uncertainties within the economy. So far in 2017, the economy is sending mixed signals, which makes it difficult for shippers to know which mode to invest in and when. The U.S. economy grew at a low, annualized rate of 1.2% in the first quarter but grew to a rate of 2.6% in the second quarter. In mid-2017, the unemployment rate fell to its lowest level in a decade, and the International Monetary Fund predicted 3.5% worldwide economic growth in 2017.

The global economy faces uncertainties as well, which can affect global freight balances, directional imbalances as a result of trading patterns and available capacity. That volatility could drive prices higher for transportation services, and 3PLs will have to closely monitor and manage relationships and their transportation networks. To remain successful, 3PLs must focus on both immediate and strategic solutions.

When economic conditions exhibit uncertainty or variability, companies need the ability to react quickly and remain nimble with their supply chain options. To an increasing extent, shippers that rely on 3PL capabilities are asking for, and benefiting from, service offerings that are sufficiently flexible and robust to accommodate changing business and market conditions.

Supply chains are becoming more complex, and time compressions are continuing to take place. In addition, consumers are demanding greater convenience, shippers and retailers are working to streamline inventories, and many industries are experiencing shorter product lifecycles. All of this means 3PLs must be able to react quickly when change arises and scale up or down promptly based on demand.

Logistics providers have gained flexibility by being mode-agnostic, allowing them to select the most cost-effective transportation methods. Truckload capacity, the fluctuating price of fuel, and congestion at ports or border crossings can alter preferred modes. Shippers increasingly expect 3PLs to serve as a single solution, and mergers and acquisitions among 3PLs continue to take place as 3PLs look to fill any gaps in markets, services, geographies, etc.

Demands and expectations of outsourced logistics services are constantly evolving and shifting, and 3PL providers are investing in the talent, processes and technology that can drive the business forward. The 22nd Annual 3PL Study continues to reinforce the suggestion that 3PLs and shippers are becoming more proficient at what they do, which enhances the quality of 3PL relationships and improves performance.

As relationships between 3PLs and shippers become more collaborative and less transactional, logistics providers are able to streamline overall operations within shippers' supply chains, improve service levels and increase efficiency. They are also able to focus on supply chain security, sustainability and, increasingly, philanthropy.

As 3PLs continue to refine and improve their core offerings, they are developing new ways to enhance customers' supply chains. Shippers are able to take advantage of the advanced visibility, data collection and analysis that more and more 3PLs are providing.

Retailers are working to reduce the amounts of inventory they carry, which frees up capital and increases the pace at which companies can react to changing consumer demands. A highly-functioning supply chain plays a key role in ensuring the functionality of a just-in-time inventory system, and shippers are relying on logistics providers for services and increased visibility that can help them strengthen and streamline their supply chains and react quickly.

In today's environment, decisions on modifying the course of a shipment can be made at nearly any point in the supply chain. Due to real-time visibility into the supply chain, a product is no longer on a set course once it leaves the warehouse. Weather disruptions, traffic delays or even a shift in consumer demand can alter a product's course to ensure it arrives when and where it is needed. Innovative solutions to capture and analyze data, as well as the ability to optimize the supply chain, are providing greater value and flexibility to shippers.

Logistics providers are investing in their IT solutions, replacing legacy systems and processes with innovative solutions and leading-edge approaches. This is already evident in the adoption of transformative supply chain software, greater use of mobile technologies in key supply chain processes at both shipper and 3PL organizations, and greater movement toward the use of "cloud-based" systems to facilitate management of supply chain processes and activities.

This year's *Annual Third-Party Logistics Study* provides useful perspectives and insights relating to the 3PL sector and how 3PLs and customers may position themselves to be as successful as possible in the future. For further insight into the details of the study and the key elements of the research process, please see the section titled "About the Study."

3PL Usage Reflects Global Economic Trends

Although global demand for logistics and supply chain services has shown mixed results over the past several years, variability in global markets and global economies resulted in differences by region. **Figure 1** shows global 3PL revenues by region for 2013 to 2016 as reported by Armstrong & Associates Inc., and the percentage increases (or decreases) from year-to-year. Also included for each region are compounded annual growth rates (CAGR) of 3PL revenues from 2010 to 2016.

Global 3PL revenues decreased to $802.2 billion in 2016 from a total of $808.8 billion in 2013. This resulted from the net impact of increases in 3PL revenues in Asia-Pacific and North America, and decreases in Africa, CIS/Russia, Europe, Middle East, and South America. A review of global 3PL revenues from 2015 to 2016 showed increases for Asia-Pacific (+4.4%), Europe (+0.4%) and North America (+2.1%), while other regions evidenced decreases in 3PL revenues. Between 2010 and 2016, the CAGR (compounded annual growth rate) of 3PL revenues increased in Africa (+1.6%), Asia-Pacific (+5.7%), Middle East (+2.4%), and North America (+3.8%), while decreases were shown during the same time span for CIS/Russia (-3.3%), Europe (-0.6%), and South America (-0.7%).

Overall, variations in 3PL revenues are due to relevant economic and political differences that distinguish these regions from one another. The recessionary environments experienced in some regions more than others have a major impact on 3PL revenues in these regions.

3PL User Spending Patterns on Logistics and 3PL Services

The study showed 3PL users report an average of 50% of their total logistics expenditures are related to outsourcing, which coincidentally is the same amount reported in the two most recent years of this study. Total logistics expenditures include transportation, distribution, warehousing and value-added services. Interesting to note is that the 50% recorded for the current and past two years represents an increase over historical results, a trend the study will continue to monitor.

FIGURE 1: GLOBAL 3PL REVENUES SHOW MIXED RESULTS

Region	2013 Global 3PL Revenues (US$Billions)	2014 Global 3PL Revenues (US$Billions)	2015 Global 3PL Revenues (US$Billions)	2016 Global 3PL Revenues (US$Billions)	Percent Change 2013 to 2014	Percent Change 2014 to 2015	Percent Change 2015 to 2016	CAGR 2010 to 2016
Africa	29.1	29.8	27.4	26.2	2.4	-8.1	-4.4	1.6%
Asia Pacific	278.2	289.0	292.1	305.0	3.9	1.1	4.4	5.7%
CIS/Russia	36.4	33.7	23.4	21.7	-7.4	-30.6	-7.3	-3.3%
Europe	190.2	195.8	171.6	172.3	2.9	-12.4	0.4	-0.6%
Middle East	44.2	45.2	40.5	40.2	2.3	-10.4	-0.7	2.4%
North America	184.7	195.7	195.5	199.6	6.0	-0.1	2.1	3.8%
South America	46.0	45.0	37.9	37.2	-2.2	-15.8	-1.8	-0.7%
Grand Total	**808.8**	**834.2**	**788.4**	**802.2**	**3.1**	**-5.5**	**1.8**	**2.8%**

Increased Use of Outsourcing Continues to Outpace Moves to Insourcing

A primary observation throughout the 22 years of *Annual Third-Party Logistics Studies* is that while some customers report an increased use of outsourced logistics services, others have indicated a return to insourcing some or all of the same services. Movements to either increased or decreased use of outsourcing may be measured in terms of funds expended on outsourced logistics services, percent of overall logistics spend represented by outsourcing or number of activities outsourced.

Outsourcing: 61% of shippers indicate they are increasing their use of outsourced logistics services this year, which compares to a figure of 58% reported last year. In comparison, 83% of 3PL providers agreed their customers evidenced an increase this year in their use of outsourced logistics services, which compares to 88% last year. These figures are consistent with the generally positive growth rates for 3PL services, particularly in the North America and Asia-Pacific regions, as discussed above.

Insourcing: This year, 28% of shippers indicate they are returning to insourcing many of their logistics activities, which is higher than the 26% reported last year but still lower than the 35% reported two years ago. Also, 42% of 3PL providers agree that some of their customers are returning to insourcing, a slight increase from the 38% reported last year. While these percentages may seem to conflict, individual shipper responses pertain only to their organization's directions, while the 3PL responses reflect the providers' thoughts about their overall group of customers.

Reducing or Consolidating 3PLs: This year 53% of 3PL users report reducing or consolidating the number of 3PLs they use, compared to the 47% reported in the 2017 study as well as the 57% reported in the 2016 study.

An observation that we identified in recent years is that the percentage of 3PL users (shippers) reporting increased use of outsourced logistics services has outstripped the percentage of 3PL users indicating they have returned to insourcing many of their logistics activities by 3:1. For this year and the past two years, the ratio is closer to 2:1 (61% divided by 28% for the current study).

Shipper Experiences with 3PLs: Measures of Success

Among this year's survey findings is that 92% of shippers report their relationships with 3PLs generally have been successful, which represents only a slight measurable increase from 91% last year. Among logistics providers, 99% reported that their relationships generally have been successful, an increase from 97% last year. Considering the "margin of error" that is present in these percentage figures, the most accurate statement is that both shippers and 3PLs have similar thoughts about the success of their relationships from last year to this year. As in previous studies, we will look to results from future studies to observe any continuing trends that may emerge.

Looking deeper into these figures, several survey results are provided below. As noted in previous years' studies, the percentage figures from 3PL respondents typically run higher than those from shipper respondents.

- 73% of 3PL users and 92% of 3PL providers agree that 3PLs provide new and innovative ways to improve logistics effectiveness;
- 71% of 3PL users and 97% of 3PL providers agree that the use of 3PLs has contributed to reducing overall logistics costs; and
- 81% of 3PL users and 98% of 3PL providers agree that the use of 3PLs has contributed to improving services to the (ultimate) customers.

Expectations in Shipper-3PL Relationships

Third-party logistics providers can add value to customers that go far beyond cutting costs, which is shifting the conversation from moving loads at the lowest possible cost to maximizing value realized from the overall network. That means today's supply chain is no longer just about moving products from Point A to Point B, but also about creating dynamic and responsive supply chains that can create a competitive advantage for shippers. Also, it is widely recognized that 3PLs can help shippers meet fulfilment requirements while ensuring shipments are accurate and on time. 3PLs are also helping shippers speed their products to market and flex up or down based on demand.

The current 3PL study also reinforced the need for and importance of openness and transparent and effective communication between 3PLs and shippers. Both parties must be sufficiently agile and flexible to accommodate current and future business needs and challenges. To achieve maximum results, shippers and 3PLs continue to rely on "gainsharing" and "collaboration" to strengthen relationships and increase efficiencies.

Survey results this year suggest that 39% of 3PL users and 81% of 3PL providers agree that collaborating with other companies, even competitors, can help to achieve logistics cost and service improvements. More broadly, success with these types of initiatives may be a key facilitator to achieving the more strategic goals relating to the need for alignment.

What Shippers Outsource and What 3PLs Offer

Figure 2 shows the percentages of shippers outsourcing specific logistics activities. Among the general observations are the following:

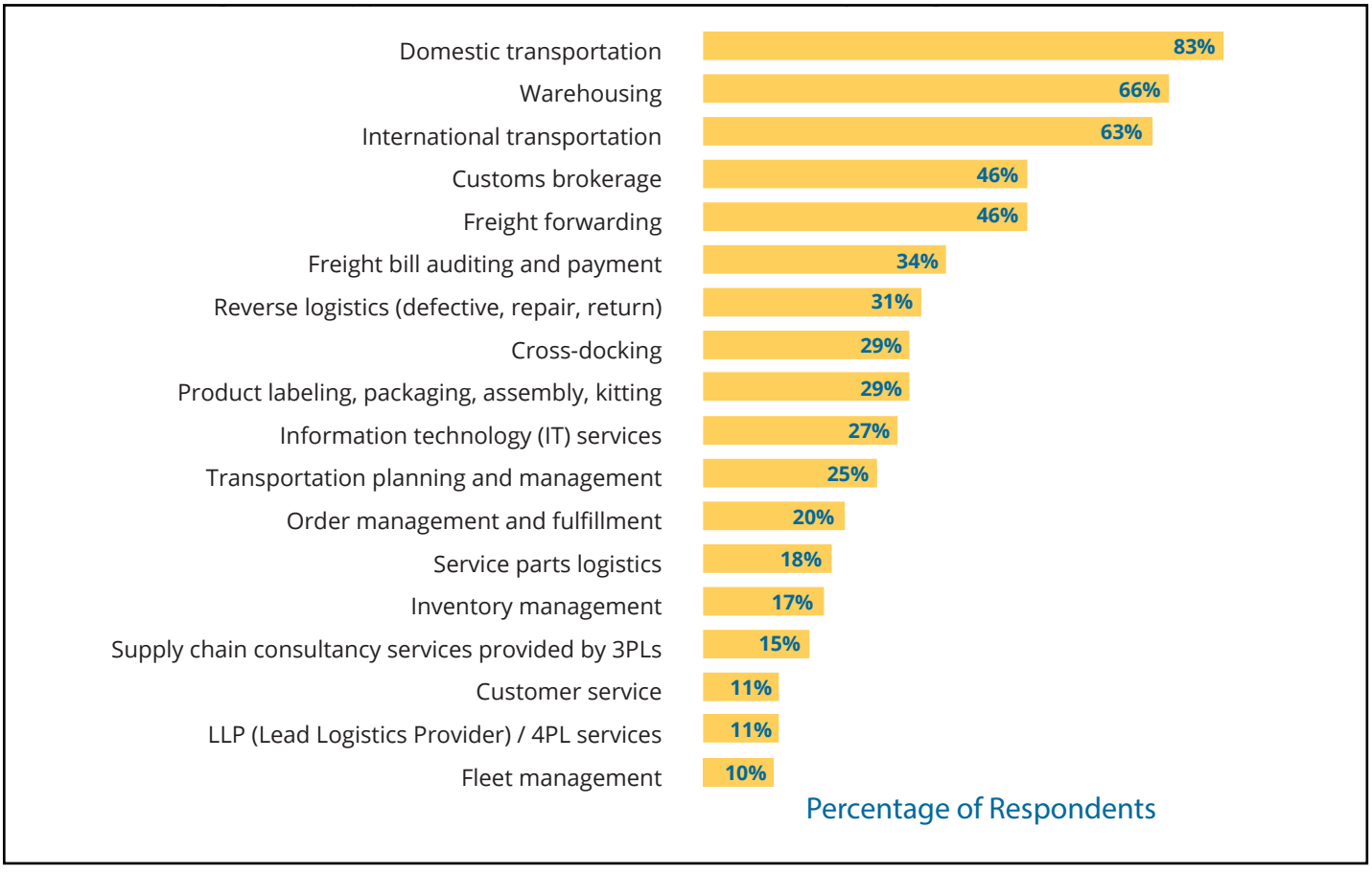
Similar to last year, the most frequently outsourced activities are domestic transportation (83%), warehousing (66%), international transportation (63%), customs brokerage (46%) and freight forwarding (46%).

The less frequently outsourced activities continue to be those that are more strategic and customer-facing. Examples include: service parts logistics (18%), inventory management (17%), supply chain consulting services (15%), customer service (11%), lead logistics provider/4PL services (11%), and fleet management (10%). Comparing these figures with those of last year's study indicates some movement towards increased outsourcing of these types of activities.

Interestingly, the percentage of users indicating the outsourcing of information technology (IT) services increased to 27% in the 2018 study from 17% in the previous year. Clearly, this one data point does not represent a trend, so additional years' data will be needed to comment further.

Overall, the data from this year's study supports the idea that shippers rely on their 3PLs for a broad range of logistics/supply chain services, and that some of these are exhibiting growth over time. As mentioned in last year's study, this suggests that as 3PLs offerings mature, shippers are increasingly taking advantage of their various areas of expertise.

FIGURE 2: SHIPPERS CONTINUE TO OUTSOURCE A DIVERSITY OF LOGISTICS SERVICES



3PL's IT Capabilities: Unquestionably a Key Differentiator Among 3PLs

Findings from the current study continue to reinforce how important it is for 3PLs to provide a range of IT-based services to help create value for their shipper-customers. **Figure 3** summarizes shipper responses to the question "which information technologies, systems or tools must a 3PL have to successfully serve a customer in your industry classification?"

Again this year the most frequently cited technologies are those that are more execution- and transaction-based capabilities. Examples include warehouse/distribution center management, transportation management (planning and scheduling), visibility and electronic data interchange. Other commonly cited technologies include web portals, bar coding, network modeling and optimization, supply chain planning, transportation sourcing and global trade management tools.

Among the types of IT-based capabilities that generated discussion at workshop as candidates for future growth are yard management, advanced analytics and data mining tools, cloud-based systems and distributed order management. Generally, these more frequently cited technologies tend to parallel the types of logistics services that were profiled in the preceding section.

Beginning 16 years ago, this study has tracked measurable differences between shipper's opinions as to whether they view information technologies as necessary elements of 3PL expertise and whether they are satisfied with their 3PLs' IT capabilities.

Referred to as the "IT Gap," **Figure 4** charts the behavior of this analytic from 2002 to present. Two major trends should be evident from an inspection of this bar chart: 1) the percentage of shippers indicating that IT capabilities are a necessary element of 3PL expertise has remained at a very high level since the question was added to the study (91% in the current study); and 2) the percentage of shippers indicating satisfaction with 3PL IT capabilities has increased to 56% in the current study from 27% in 2002.

FIGURE 3: SHIPPER VIEWS OF NEEDED IT-BASED CAPABILITIES BY 3PLS

Information Technology	Percentage Reported by Shippers	Percentage Reported by Providers
Warehouse/distribution center management	70%	72%
Transportation management (Planning)	63%	79%
Visibility (Order, shipment, inventory, etc.)	61%	80%
Transportation management (Scheduling)	59%	75%
EDI data interchange (Orders, advanced shipment notices, updates, invoicing)	59%	81%
Web portals for booking, order tracking, inventory management and billing	47%	68%
Bar coding	41%	50%
Network modeling and optimization	39%	62%
Supply chain planning	39%	61%
Transportation sourcing	38%	59%
Global trade management tools (e.g., Customs processing and document mgt)	35%	37%
CRM (Customer relationship management)	31%	60%
Customer order management	28%	53%
Yard management	27%	35%
Advanced analytics and data mining tools	27%	54%
Cloud-based systems	25%	42%
Distributed orer management	18%	32%
RFID	16%	23%

However, the percentage of shippers indicating satisfaction dropped somewhat to a reported 56% this year from 65% last year. This could be because shipper expectations have increased as technology has improved or because shippers are seeking enhanced analytical capabilities to help drive more effective supply chain decisions. These thoughts were suggested by key supply chain leaders who attended the study workshop to discuss the study and share their insights. Attendees agreed that technology is increasing at a rapid pace, and shippers are expecting more data than ever.

The amount of available technology can also leave those within the supply chain feeling like they are missing out on certain capabilities, even if they are unsure of its applicability. Visibility and timely reporting is expected, but those expectations aren't always defined, which may help explain the current shift in the IT Gap.

Basic reporting of relevant data has become table stakes, and many shippers are seeking greater analysis to help drive supply chain decisions. Many shippers have realized that the information collected is worthless if it isn't easily accessible and actionable, which is increasing reporting expectations.

Nevertheless, it has become very clear that there is significant demand among shippers in general to look to their 3PLs as a source of capable IT technologies. Although the "tangible" services provided by 3PLs may be viewed in terms of operational and execution-based capabilities, competencies in the IT area are fast-becoming differentiating factors when shippers are making selection decisions and that will likely increase as the industry embraces data-driven decision making, blockchain supply chain capabilities and streamlined delivery networks.

Key Takeaways

- Global demand for logistics and supply chain services has had mixed results over the past several years, and global 3PL revenues decreased to $802.2 billion in 2016 from $808.8 billion in 2013 due to the net impact of increases in 3PL revenues in Asia-Pacific and North America, and decreases in Africa, CIS/Russia, Europe, Middle East, and South America.

- Total logistics expenditures as a percentage of sales revenues has increased, reaching 11% in the current year's study from 10% in the previous year. Over the same timeframes, the percentage of shippers' transportation spend managed by 3PLs increased to 55% from 53%, while the percentage of shippers' warehousing spend managed by 3PLs decreased slightly to 39% from 40%.

- Users of 3PL services report an average of 50% of their total logistics expenditures are related to outsourcing, which is the same amount reported in the two most recent years of this study.

- The 2018 22nd Annual 3PL Study reported that 61% of shippers are increasing their use of outsourced logistics services, compared to a figure of 58% reported last year. However, 83% of 3PL providers agreed their customers increased their use of outsourced logistics services, compared to 88% last year.

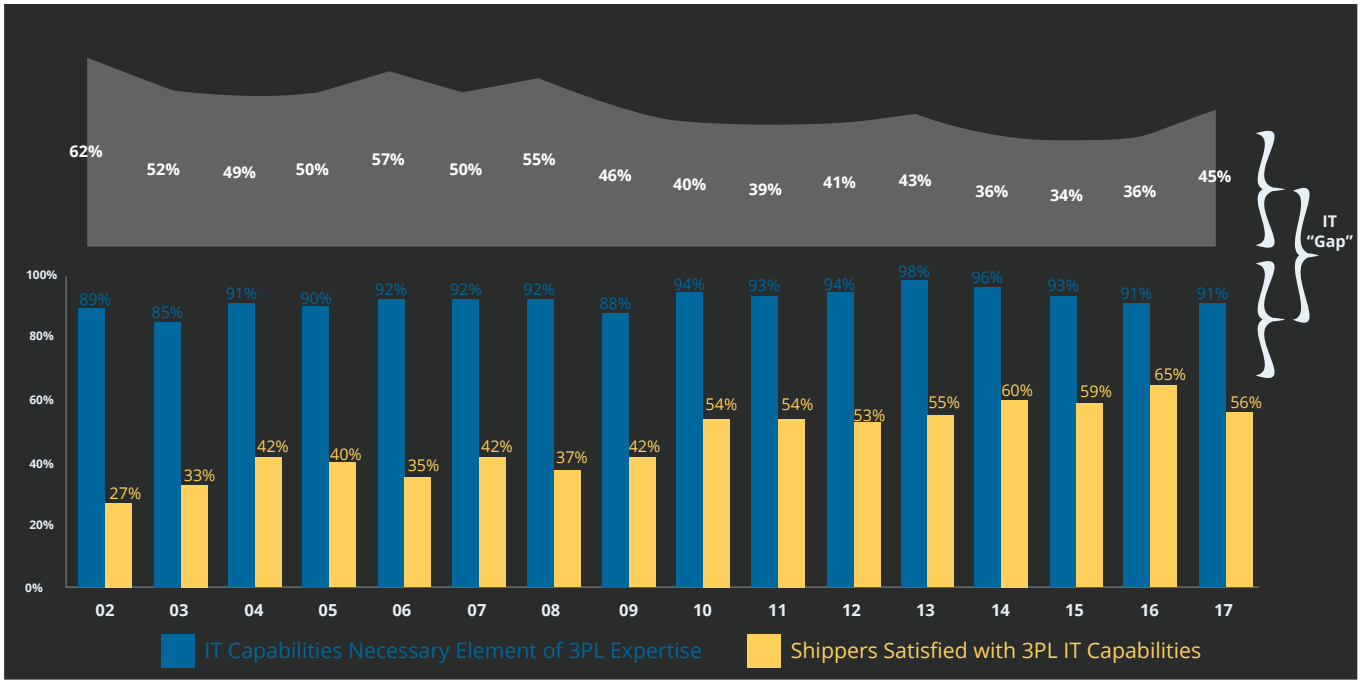
- Shippers outsource a wide range of logistics services, with the most common being domestic transportation (83%), warehousing (66%), international transportation (63%), customs brokerage (46%) and freight forwarding (46%).

- Activities that are more strategic, IT-intensive and customer-facing tend to be outsourced to a lesser extent. Among shippers, 15% said they utilize 3PL-provided supply chain consulting services, 11% outsource customer service, 11% outsource lead logistics provider services and 10% outsource fleet management.

- The IT Gap widened this year, with 56% of shippers indicating satisfaction, which dropped somewhat from 65% last year. This could be because shipper expectations have increased as technology has improved or because shippers are seeking enhanced analytical capabilities to help drive more effective supply chain decisions.

- Conversations surrounding the supply chain have made their way into the board room, and an effective supply chain can be a key differentiator between businesses in all sectors. The 3PL sector is increasing globally, and 3PL providers are refining and expanding their core competencies, which in turn is allowing their customers (shippers) to focus on their core competencies.

FIGURE 4: THE "IT GAP" – ARE WE SEEING SOME STABILIZATION?



BLOCKCHAIN FOR SUPPLY CHAIN

Tracking the Flow of Goods and Establishing Trust

Data-driven decision making is allowing shippers and 3PLs to increase efficiencies, streamline the movement of goods and accurately manage inventories, and those within the supply chain agree that having more information can help drive better results. However, companies struggle to integrate information flows and derive value from data related to each movement of a shipment.

In many cases, data definitions don't align, which makes it a challenge for systems to communicate, plus there are costs involved and someone must take responsibility and pay to integrate the data. Some parties can become defensive over sharing information, but there are proven benefits to integrating data.

Greater access to information can help mitigate risk, particularly as it relates to recalls, counterfeit products and regulatory requirements. In today's operating environment, recalls typically require large, sweeping product recalls to achieve a level of comfort that all affected product is contained, and little information is available to inform the consumer and control fears. If more information on products were available, shippers could more easily identify potentially contaminated product and perform more targeted recalls. This could be particularly helpful in cases of complicated recalls.

For example, in 2009, the Food and Drug Administration asked retailers, manufacturers and consumers to dispose of every product made in the previous two years from peanuts processed by a Georgia plant at due to an outbreak of salmonella. In 2015, E. coli outbreaks at Chipotle restaurants made customers sick, harmed the company's public perception and affected its stock price. Some cases were linked to tomatoes but in others the source was unknown. In 2016, Blue Bell Ice Cream recalled product in 16 states, which followed a 2015 Listeria outbreak at the company. Greater information on products, their sources and their movement throughout the supply chain could help companies identify areas of concern and potentially pull product off the shelf faster.

Information could also discourage counterfeiting in industries prone to the practice. Counterfeit drugs, which could be contaminated or contain a wrong or inactive ingredient, are a problem within the global pharmaceutical industry. In a report on counterfeit pharmaceuticals, Pfizer said there is "growing involvement in the drug supply chain of under-regulated wholesalers and re-packagers, the proliferation of Internet pharmacies, advancements in technology that make it easier for criminals to make counterfeit drugs, and the increased importation of medicines."

Counterfeit drugs can result in revenue leakage, damage to consumer health and liability complications. In early 2017, U.S. Customs and Border Protection reported that it is seizing pill presses at a rate 19 times higher than in 2011. The presses, which are illegal unless as they are properly registered with the DEA before they are shipped, allow counterfeiters to take powder and press it into a pill that looks legitimate. The ability to check the movement of pharmaceuticals throughout the supply chain would make it easier to verify the authenticity of medications.

Greater tracking could also help meet regulatory requirements surrounding products such as conflict minerals and blood diamonds. Technologies have been thrown at these challenges in the past, such as RFID.

However, the interest in applying blockchain technology to the supply chain is gaining traction, and companies ranging from the shipping company Maersk to Walmart are embracing the potential that comes from transferring the title of ownership and recording activity as shipments move between businesses and throughout the supply chain.

With blockchain, each movement is broken down into a block, and transactions are documented every time a shipment changes hands. By linking the blocks together, everyone can see who has been a part of the process and can drill down into specific details associated with each movement.

That creates a permanent, digital history as products move throughout the supply chain from the original source through the final leg of the journey. The goal is to create one version of the truth, link information, create transparency surrounding all parties involved in the supply chain, and identify how they participated in the flow of a good or service. As a bonus, the digital history is not owned or controlled by any one trading partner, so it's available for all verified partners to use.

Blockchain still encompasses the various familiar transactions in the supply chain, but it adds a level of security because each transaction is validated and recorded by an independent third party, protecting the integrity of the transactions. No one party can modify, delete or even append any record without the consensus from others on the network.

Benefits of Blockchain

Because blockchain would track and verify movements throughout the production, shipping and delivery phases of a supply chain, it would aim to eliminate many of the risks and concerns involved in the process of moving products.

Within each movement, or block, blockchain would identify the parties involved, price, date, location, quality, state of the product, and any other information relevant to managing shipments and the products on the shipments. The public availability of the ledger makes it possible to trace back every product to the very origin of the raw material used. Important data can be updated in real time, which could eliminate the need for reconciliation with each other's internal records and give each party within the supply chain network more detailed visibility of movements and the product's status.

What's more, the decentralized structure of the ledger makes it impossible for any one party to hold ownership or manipulate the data. Because no single company has total control, it increases accountability and the security of data that is transmitted.

The information shared would increase visibility and minimize the potential for human error. It could also dramatically reduce time delays, eliminate added costs, minimize human error and decrease corruption. The increased accuracy and accountability of the data managed within blockchain could provide more opportunity to drive analytics, which is becoming more important in today's data-driven supply chain.

When a blockchain is managed all the way to the end user, it also has the potential to create demand chains as it closely tracks and transmits data in real time related to consumption. By partially eliminating the multiple-party path of information that has historically been transmitted, shippers can get a greater understanding of real-time demand.

One of the biggest benefits to shippers is that blockchain technology guarantees security, transparency and authenticity to wary customers. It promotes standardization, minimizes fraud, and enables accuracy and consistency of each shipment. It could also help overcome delays and errors, resulting in more streamlined and efficient supply chain management.

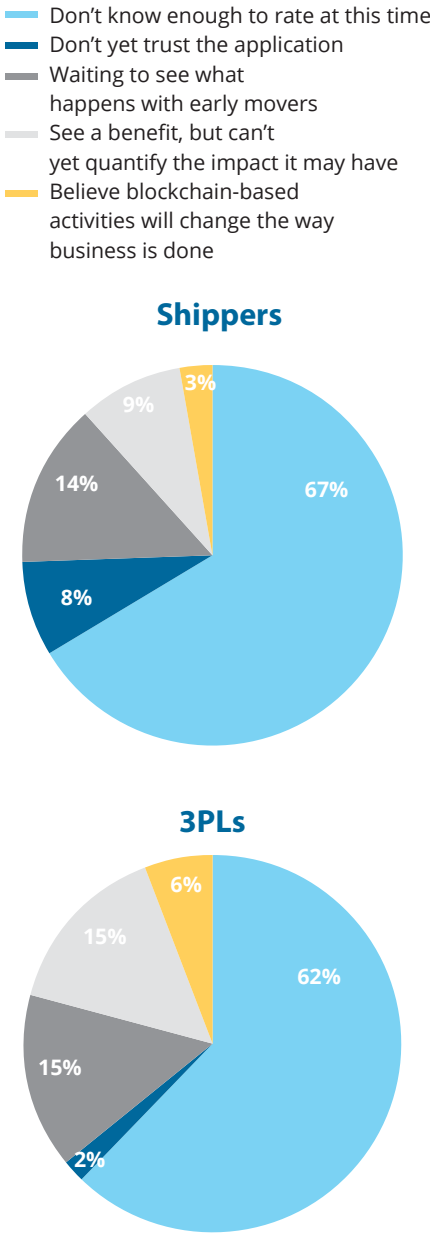
"We believe that this new supply chain solution will be a transformative technology with the potential to completely disrupt and change the way global trade is done," said Bridget van Kralingen, senior vice president, Industry Platforms, IBM, in a written release.

An Emerging Technology

The technology is leading-edge and is making inroads, but there is still a lack of awareness around blockchain's use.

The majority of respondents—67% of shippers and 62% of 3PL providers—said they don't know enough about blockchain to rate it at this time, as shown in **Figure 5**.

FIGURE 5: POTENTIAL BENEFIT EXPECTATIONS

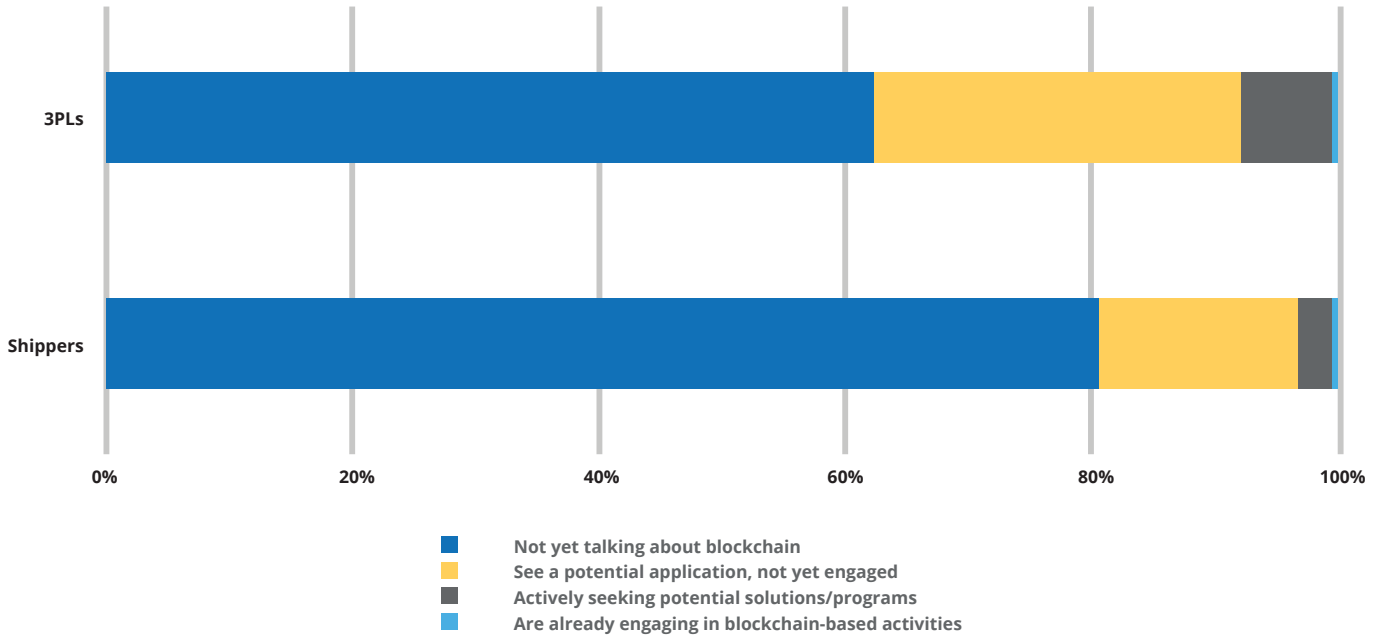


Among shippers, 14% said they are unsure of the technology and are waiting to see what happens with early movers, compared to 15% of 3PLs. However, 6% of 3PLs said blockchain is a game changer and will change the way their business is done, compared to just 2% of shippers.

3PLs were slightly more optimistic about the technology ascompared to shippers, with 15% of 3PLs saying they see a benefit but can't yet quantify the impact it will have compared to 9% of shippers. Only 2% of 3PLs said they don't yet trust the application, compared to 8% of shippers.

Because of its nascent stage, the blockchain ecosystem needs further development. Most shippers—81%—and 3PLs—62%—said they are not yet talking about blockchain, shown in **Figure 6.**

FIGURE 6: CURRENTLY SEEKING OR USING BLOCKCHAIN SOLUTIONS



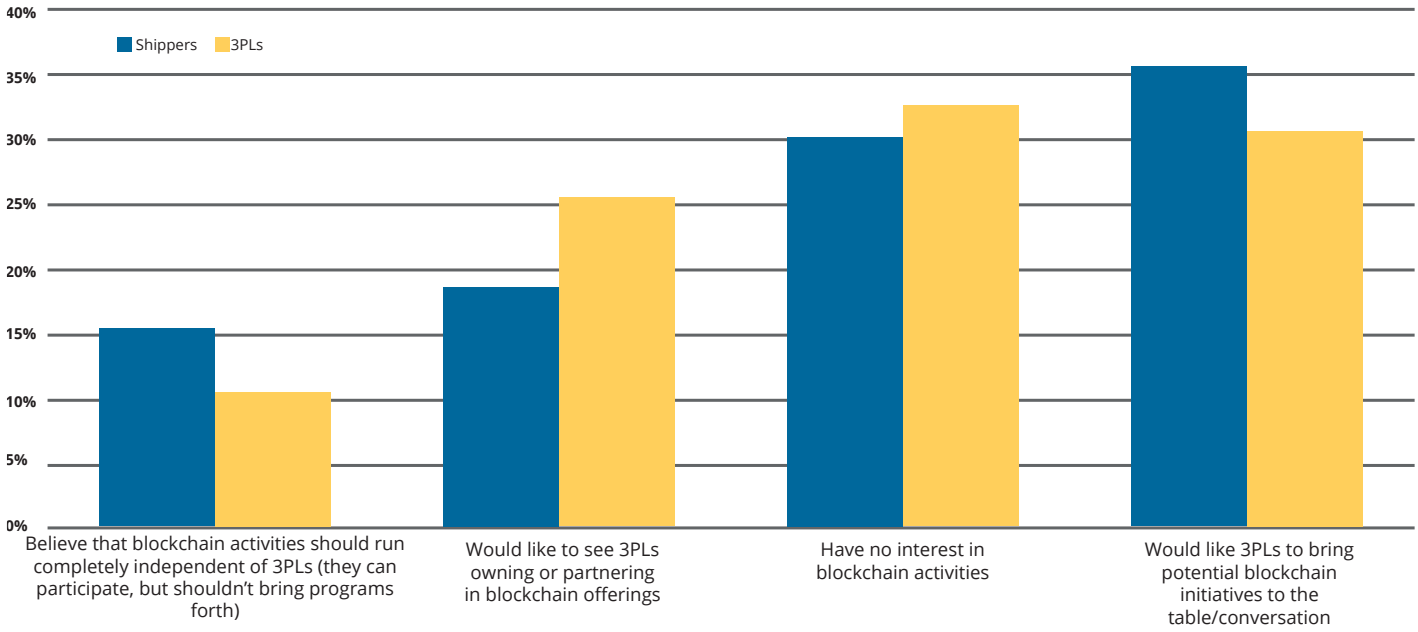
However, interest is increasing, particularly for logistics providers. Among 3PLs, 30% said they see it as a potential application but are not yet engaged compared to 16% of shippers. More 3PLs—7%—are actively seeking potential solutions, compared to less than 2% of shippers.

There is also growing interest in the technology, which will likely grow as more shippers test and prove it. The study found that about one-third of shippers—36%—are interested in conversations surrounding blockchain and would like 3PLs to bring potential blockchain initiatives to the table; 30% of shippers have no interest in blockchain activities; 19% would like to see 3PLs owning or partnering in blockchain activities; and 15% believe blockchain should be completely independent of 3PLs.

If a 3PL is willing to invest proactively in and partner with a blockchain provider, it may be a way to differentiate themselves in the market.

Among 3PLs, 33% have no interest in blockchain activities; 31% would like 3PLs to bring potential blockchain initiatives to the table; 26% would like to see 3PLs owning or partnering in blockchain activities; and just 11% of 3PLs believe blockchain should be completely independent of 3PLs, shown in **Figure 7.**

FIGURE 7: LEVEL OF INTEREST IN BLOCKCHAIN-RELATED ACTIVITIES



Blockchain provides centralized housing of data across multiple systems, allowing for uniform and complete tracking of a product's full lifecycle. Shippers and 3PLs were almost equally interested in the use of blockchain for traceability—64% of 3PLs and 65% of shippers—as well as the use of blockchain to meet regulatory requirements—37% of 3PLs and 36% of shippers, shown in **Figure 8.**

3PLs were more interested in the potential of blockchain to provide visibility and data sharing with their partners—65% of 3PLs compared to 47% of shippers. 3PLs also had greater interest in using blockchain to enhance the safety and security of products, such as reducing theft and preventing counterfeiting, and monitoring conditions, such as temperature and exposure. Shippers had more interest than 3PLs—33% of shippers compared to 23% of 3PLs—in using blockchain to ensure ethical compliance, such as product origin and labor.

A June 2017 article in *The Economist* reported that governments might become big backers of blockchain technology. A survey of government leaders found that nine in ten government organizations said they plan to invest in blockchain technology to help manage financial transactions, assets, contracts and regulatory compliance by next year, *The Economist* reported. 3PLs were more interested in the potential of blockchain to provide visibility and data sharing with their partners—65% of 3PLs compared to 47% of shippers. 3PLs also had greater interest in using blockchain to enhance the safety and security of products, such as reducing theft and preventing counterfeiting, and monitoring conditions, such as temperature and exposure. Shippers had more interest than 3PLs—33% of shippers compared to 23% of 3PLs—in using blockchain to ensure ethical compliance, such as product origin and labor.

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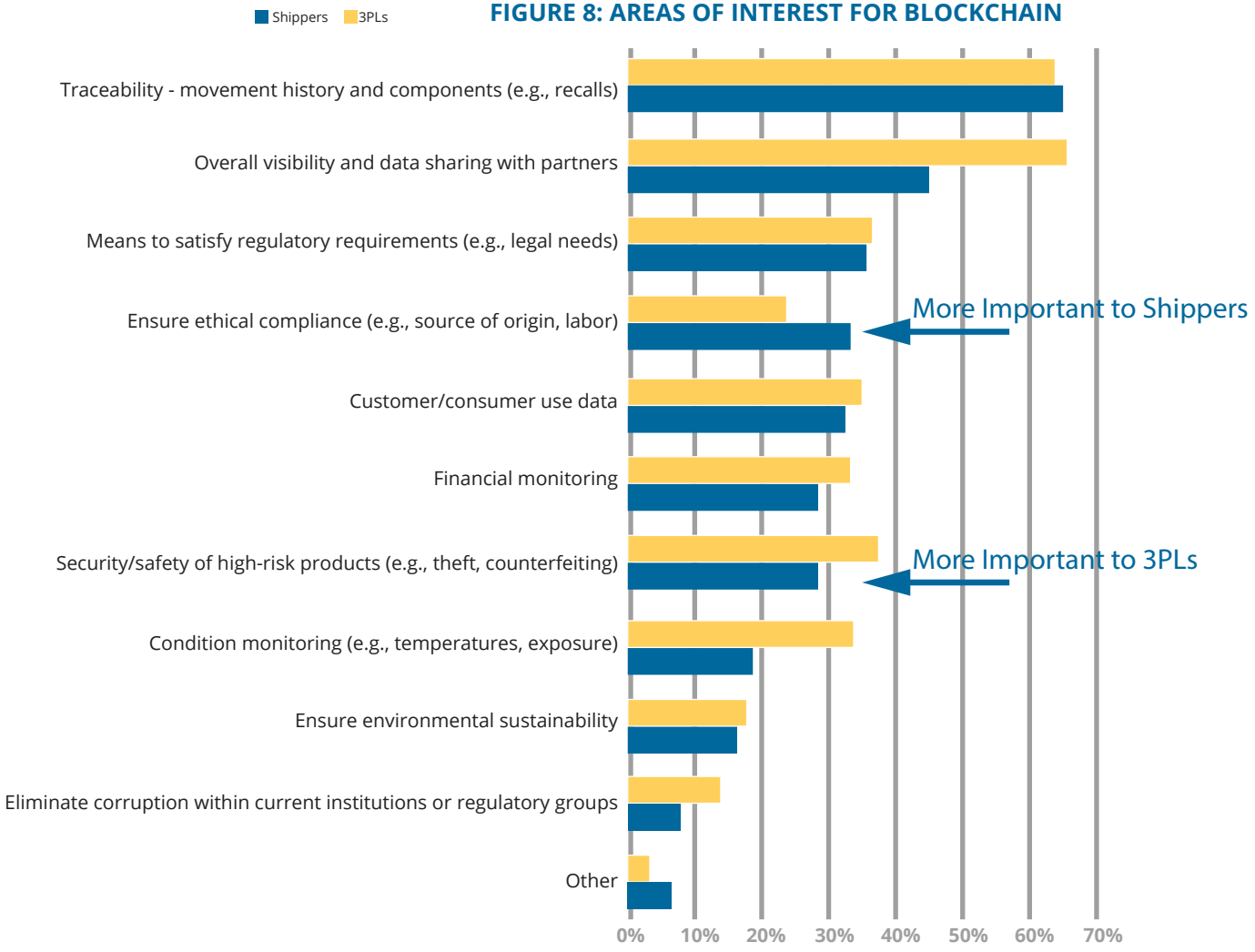
FIGURE 8: AREAS OF INTEREST FOR BLOCKCHAIN



Challenges with Blockchain

Blockchain technology makes supply chain integration much more real. It has the potential to change the game, but its application isn't simple or straightforward.

There are challenges with the technology, including the development and governance of blockchain data sharing. Because blockchain creates a centralized, accessible ledger, there needs to be interoperability across private and public blockchains, which will require standards and agreement.

Along with scalability issues and lack of protocols, privacy is one of the concerns blockchain technology must address. Shippers and 3PLs will have to determine how much information should be made available. In some situations, companies may not want to provide full transparency of all information to everyone in the supply chain.

Liability could also become a concern. The more information those within the supply chain have, the more they can be held accountable for, and companies may determine they don't want such a detailed level of tracking.

Moreover, blockchain technology in itself does not address the reliability of its records. Often a person acting as a trusted third party records the information on the blockchain. In the case of tracking slavery or other unethical business practices, an individual can simply enter into the blockchain system that the business is legitimate and upstream actors can thus be fooled.

What's more, blockchain requires third-party verification of data, which introduces additional costs.

The Value of Blockchain

Blockchain isn't a panacea solution that is fit for all supply chains, and how companies can and will apply blockchain should be directly dependent on the return on investment. Certain industries, such as fair-trade minerals, food, prescription drugs and fine arts, may find greater value in blockchain capabilities.

The technology can help remove the risk of counterfeit goods because shippers can easily track every person that has touched the products. In the future, consumers may make choices based on what information is available about a product.

As referenced earlier, in the food and beverage industry, blockchain would track the movement of products from farm to fork, which would make it easier to find and pull products involved in a recall. If a recall did take place, blockchain provides the data and information that allows shippers to manage the process and speed it up, giving the retailer or manufacturer accurate information to manage public perception. Blockchain could also allow shippers to validate temperatures associated with each movement and ensure each movement was secure.

Walmart plans to use blockchain technology to track the movement of food products, including pork, in China. The mining company BHP Billiton has implemented blockchain to track mineral analysis conducted by outside vendors, and the startup Everledger has shared unique, identifying data on more than one million diamonds to help jewelers comply with regulations barring "blood diamond" products.

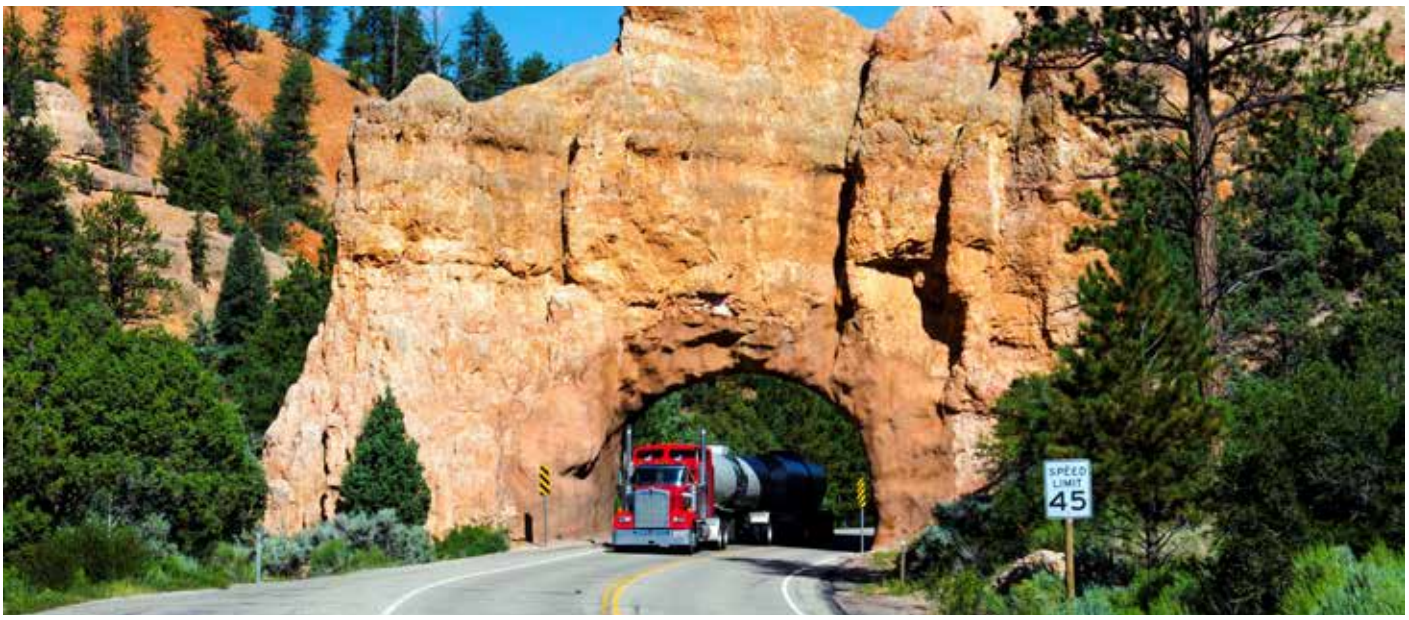
IBM and Maersk announced that they are collaborating to use blockchain technology. The companies said the technology would help them manage and track the paper trail of tens of millions of shipping containers across the world by digitizing the supply chain process from end-to-end to enhance transparency and the highly secure sharing of information among trading partners. When adopted at scale, the solution has the potential to save the industry billions of dollars, IBM wrote in a statement.

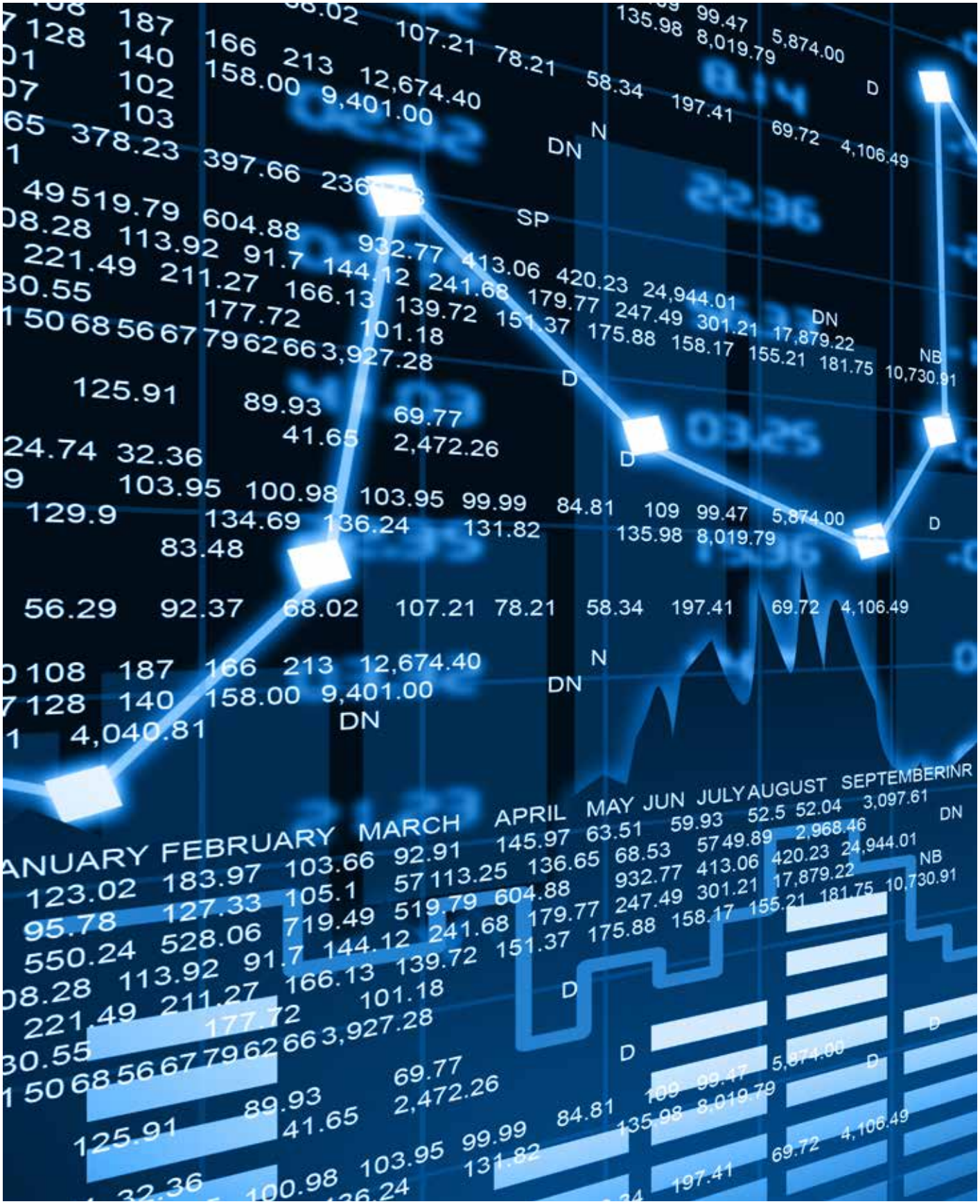
Costs to collect information have decreased, but there are still fees associated with feeding the data, and the value proposition is yet to be defined. There is a balance of mitigating risk and improving security and the costs associated with doing so, and more time is needed to determine which companies are willing to invest in the technology.

To be successful, shippers will need a clear value from it to offset the costs and so far, there doesn't appear to be an easily defined value proposition. Questions remain surrounding who will pay for it, who benefits from it, and who will own and manage the resulting data. The technology complexity will require more time for those in the supply chain to fully understand blockchain.

Key Takeaways

- With blockchain, all parties supply their information to a third party for validation. Once validated, the blocks are assembled to form a chain of information that can be used by all trading partners. Changes are also validated and executed by a third-party verification service, ensuring accuracy and authenticity.
- Because of its nascent stage, the majority of respondents—67% of shippers and 62% of 3PL providers—said they don't know enough about blockchain to rate it at this time.
- Among shippers, 14% said they are unsure of the technology and are waiting to see what happens with early movers, as compared to 15% of 3PLs.
- 3PLs were slightly more optimistic about the technology compared to shippers, with 15% of 3PLs saying they see a benefit but can't yet quantify the impact it will have compared to 9% of shippers. Only 2% of 3PLs said they don't yet trust the application as compared to 8% of shippers.
- Most shippers—81%—and 3PLs—62%—said they are not yet talking about blockchain. However, 30% of 3PL respondents said they see it as a potential application but are not yet engaged as compared to 16% of shippers. More 3PLs—7%—are actively seeking potential solutions compared to less than 2% of shippers.
- Among shippers, 36% are interested in conversations surrounding blockchain and would like 3PLs to bring potential blockchain initiatives to the table; 30% have no interest in blockchain activities; 19% would like to see 3PLs owning or partnering in blockchain activities, and 15% believe blockchain should be completely independent of 3PLs.
- Of 3PL respondents, 33% have no interest in blockchain activities; 31% would like 3PLs to bring potential blockchain initiatives to the table; 26% would like to see 3PLs owning or partnering in blockchain activities, and just 11% of 3PLs believe blockchain should be completely independent of 3PLs.
- Shippers and 3PLs were almost equally interested in the use of blockchain for traceability —64% of 3PLs and 65% of shippers—as well as the use of blockchain to meet regulatory requirements—37% of 3PLs and 36% of shippers.
- Among respondents, 65% of 3PLs were interested in the potential of blockchain to provide visibility and data sharing as compared to 47% of shippers. 3PLs were also more interested in using blockchain to enhance the safety and security of products, such as reducing theft and preventing counterfeiting, and monitoring conditions, such as temperature and exposure.
- Shippers had more interest than 3PLs in using blockchain to ensure ethical compliance, such as product origin and labor.
- Costs to collect information have decreased, but it isn't free, and the value proposition is yet to be defined. There is a balance of mitigating risk and improving security and the costs associated with doing so. More time is needed to determine which companies are willing to invest in the technology.

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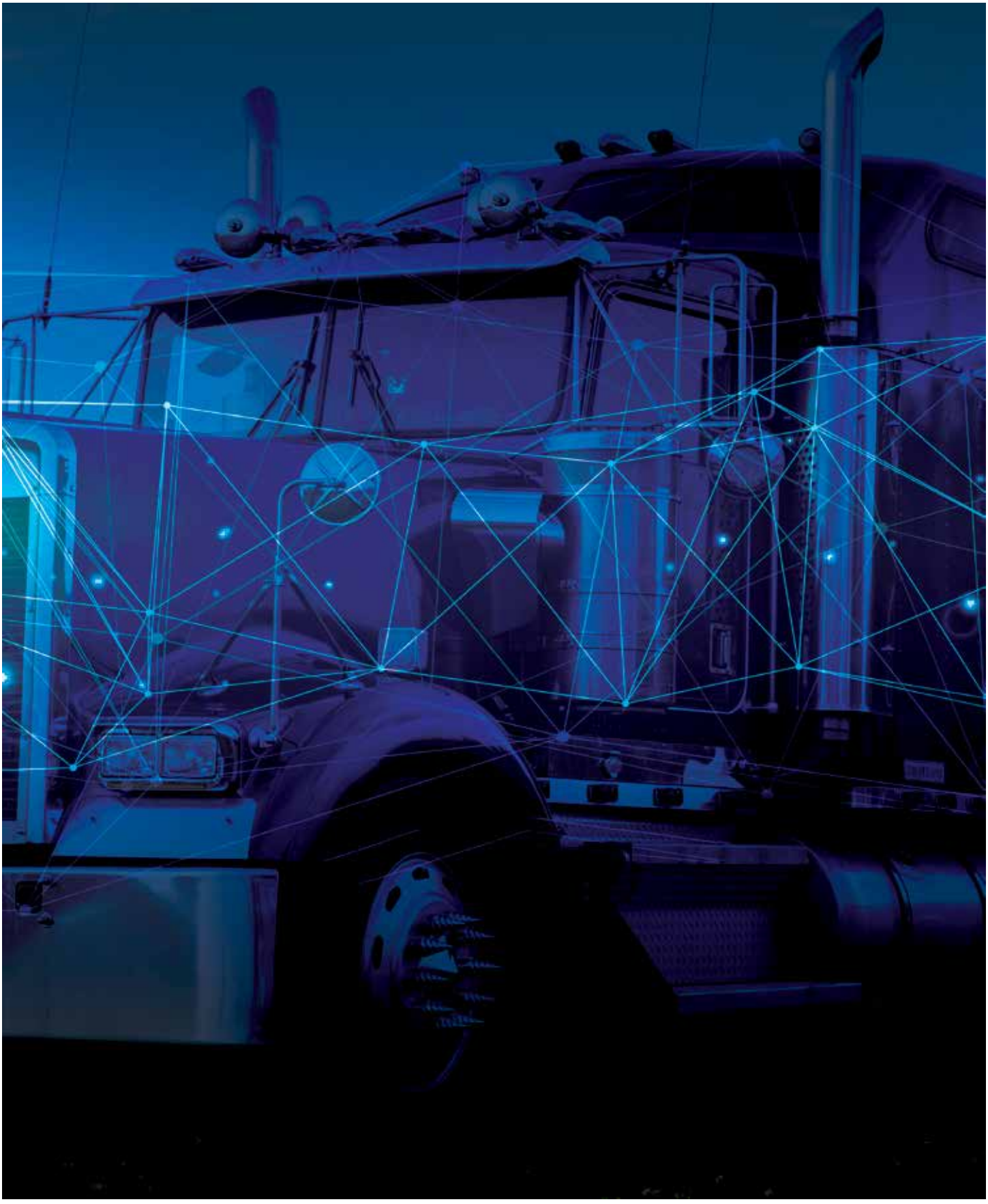
AUTOMATION AND DIGITIZATION IN THE SUPPLY CHAIN

Transforming the Movement of Goods Through Technology



Technology is developing at a rapid pace, and shippers and logistics providers are leveraging advanced technologies to enable faster and more efficient services, provide visibility and improve safety. Automation is changing everything from the vehicles that move products to warehouse operations while also assisting human workers throughout the supply chain.

Data-driven decision making is the key to increase asset utilization, improve efficiency and decrease volatility within the supply chain, and the role of data and the need to capture and transmit information continues to increase.

Big data shows the most potential within the supply chain. Among 3PLs taking part in the survey, 41% said they currently use big data analytics, compared to 25.4% of shippers. However, 67% of 3PLs and 69% of shippers said they will invest in big data analytics in the future, shown in **Figure 9**.

During the study's workshop, shippers said they were interested in using data to get more predictive and create better uptimes.

"The engine can transmit back to dispatch any fault code detected within the engine", said Tom Scollard, vice president of dedicated contract carriage for Penske Logistics.

"Now dispatch can make the decision if it is a minor issue that can be repaired after the route is finished or it's a major issue that requires either roadside assistance or a substitute vehicle. The more information we have about how our vehicles are performing and how our drivers are behaving on the road can help us drive down costs," he said.

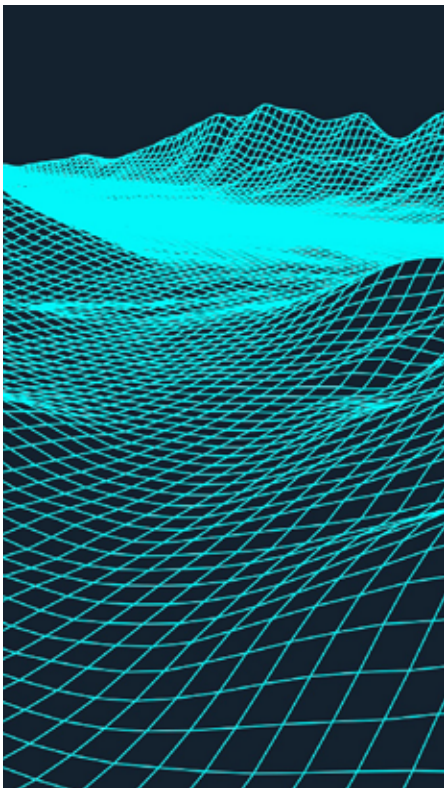
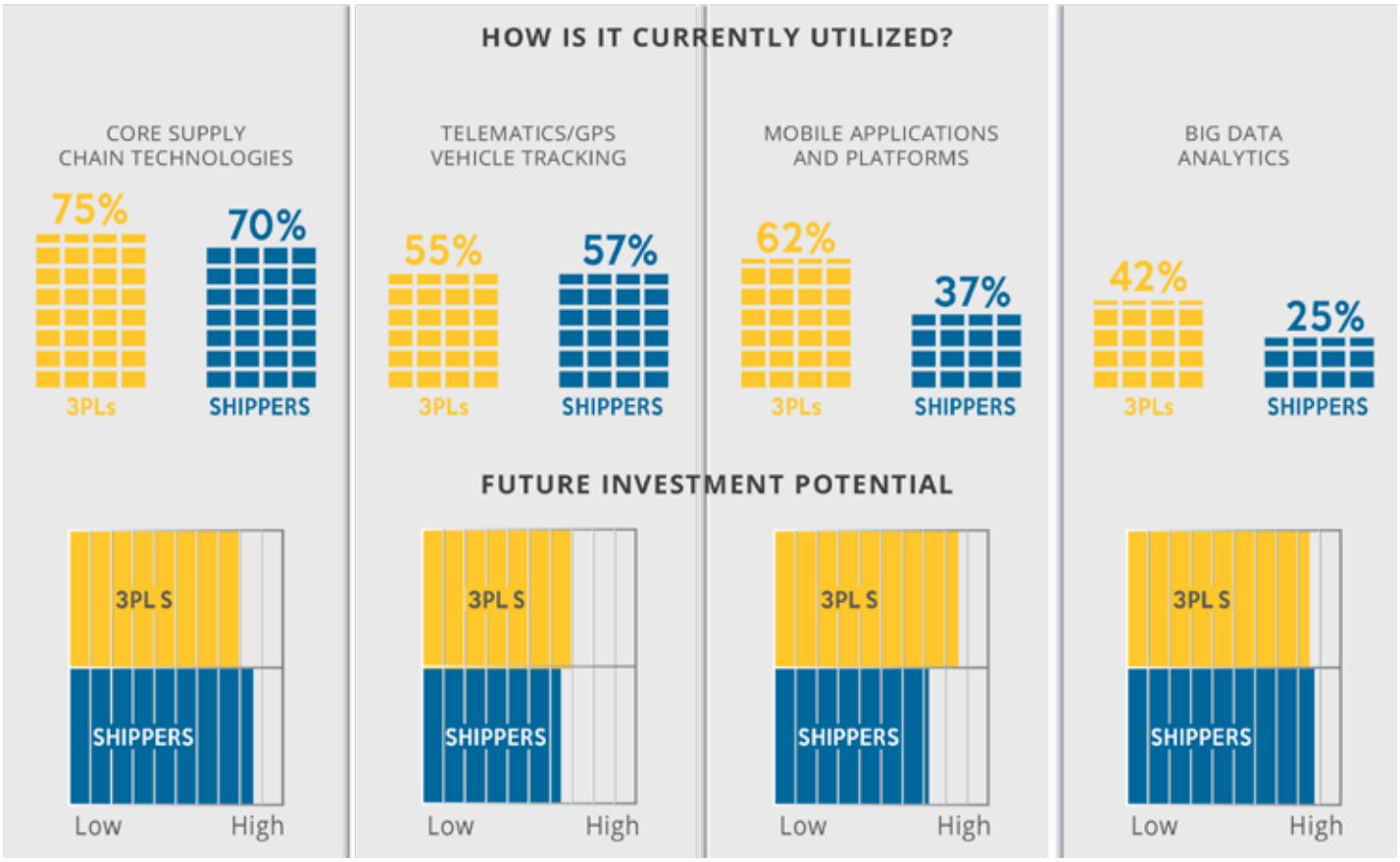


FIGURE 9: USE OF AUTOMATION AND DIGITIZATION TECHNOLOGIES



Technology in the Cab

Autonomous technologies in vehicles continue to make headlines and existing and developing onboard systems can help transportation providers increase efficiency and improve safety. Key automation trends include driver-assistance technologies, platooning and driverless transportation, which will assist in the safe transport of cargo, result in fewer accidents, improve fuel efficiency and increase driver satisfaction.

The SAE International Standard has developed five levels of automation, ranging from Level 0 (L0) in which the human driver does everything to Level 5 (L5) in which a fully automated system could perform all driving tasks under all conditions that a human driver could perform them. Most equipment today has some level of automated technology.

The trucks of the future will likely use a combination of technologies to drive productivity and safety improvements, and many are already available in Class 8 tractors. They include:

Adaptive Cruise Control with Braking: Adaptive cruise control relies on forward-looking radar to maintain a specified following distance. If the vehicle in front of the driver slows down, the following vehicle slows down as well, and the system will hold about a three-second time gap between the Class 8 tractor and the forward vehicle. The system will automatically reduce throttle, cut the engine's driving force and apply up to one-third of the foundation brakes to maintain that gap.

Lane Departure Warnings: The systems use a vision-based system with one forward looking camera to monitor the road ahead. The systems audibly warn drivers if they unintentionally leave the lane.

Collision-Mitigation Systems: This technology relies on radar, lasers or cameras to detect potential crash situations, such as when the distance between the truck and a vehicle gets too close. The systems can apply up to two-thirds of the foundation brakes to help mitigate a rear-end collision. Not only can collision- mitigation systems alert drivers but it also acts automatically if drivers don't.

Right-Side Object Detection Sensors: Using the technology, radars detect objects to the right side of the tractor and provide audible and visual warnings to alert drivers to any obstructions.

Electronic Stability Control: The National Highway Transportation Safety Administration began implementing a phased-in mandate in 2017 that will require new commercial trucks to be equipped with electronic stability control systems to minimize rollovers and crashes. If the systems detect that a vehicle is reaching its critical stability threshold, the technology intervenes by automatically reducing engine torque, applying the engine brake and activating the necessary wheel-end brakes, which reduces the likelihood of a rollover, jackknife or loss of control.

Telematics Devices: The equipment can capture and transmit hundreds of data points as a part of daily transportation operations, giving carriers a competitive advantage based on their ability to make data-driven decisions. Telematics can provide information on drivers' hours-of-service records, fuel tax reporting and more.

Just over half of respondents—55% of both shippers and 3PLs—said they currently use telematics devices. The figures remain similar for future investment, with 54% of shippers and 58% of 3PLs reporting they plan to use the technology.

In-Dash Cameras: Cameras can be used to monitor driver behavior and record what is happening on the road. In addition to helping improve driver performance, the devices can be used to examine the root cause of a crash. "There is a lot of chatter in the industry that it won't be long before insurance companies will mandate the cameras or raise premiums on carriers that don't have them," Scollard said, adding that data from cameras can exonerate a driver if he or she isn't at fault, or lead to a faster settlement if the driver is at fault.

Additional technologies remain under development and are on the horizon for Class 8 tractors, and many are already providing a competitive advantage in the commercial automobile space. They include:

Self-Driving Technology: Driverless transportation allows all end-to-end actions and decision-making for a Class 8 vehicle to be undertaken by an automated system, which could be used with or without a driver in the cab. Most of the major Class 8 manufacturers, including Paccar, Daimler and Volvo, as well as newer companies, such as Waymo and Otto, are testing autonomous technology that could be used to create self-driving vehicles.

Currently 2.5% of shippers and less than 2% of 3PLs report use of autonomous vehicles, but 27% of shippers and 3PLs report they plan to make a future investment in the technology.

Waymo, which was formerly known as Google's autonomous car venture, has installed its self-driving technology on a single Class 8 Peterbilt truck that it is testing at a private track in California. The company plans to conduct road tests in Arizona later in the year.

In October 2016, Otto, the Uber-owned self-driving vehicle operation, completed its first commercial delivery with a truck traveling 120-miles roundtrip. Otto demonstrated a system that converts a standard truck into an L4 autonomous truck, which allows a driver to be away from the steering wheel in certain driving conditions. In the test delivery, the driver monitored portions of the delivery from the sleeper berth.

The American Transportation Research Institute has identified significant safety and productivity benefits that may result from autonomous technology adoption. While technology could ultimately remove the need for a driver, it is likely that drivers will remain a critical link in the supply chain for quite some time.

Scollard said, "Our core business requires extensive driver involvement of value-add service, at either the point of delivery or the point of pickup. Our drivers are physically unloading vehicles, operating lift gates and using material handling equipment to deliver product to certain stations within the delivery point."

Drivers play a critical role in interacting with customers on both pickups and deliveries. Plus, for safety reasons the public may insist that automated vehicles have a driver present to take over in any unexpected or difficult situations. Changing technology in the cab could require drivers with different proficiencies while also strengthening drivers' abilities.

Autonomous trucks could help alleviate the driver shortage by both attracting drivers and improving efficiency, ATRI said. "L3 automation may relieve some of the stress and monotony of driving long hours, and L4 could allow drivers to work on tasks such as logistics while the vehicle is moving," ATRI said. "Additionally, the ability to rest while driving in the L4 environment could enable drivers to be at home more often rather than parked at distant locations, and to use equipment and their own labor more productively. Any gains in productivity could likewise decrease the number of trucks and drivers needed to move the nation's freight, which could act to mitigate the driver shortage problem."

However, fully autonomous vehicles are not yet a reality for 3PL providers, so they have not been adopted and adjusted for the practicalities of everyday use. In addition, most large 3PL companies already have existing fleets of non-autonomous vehicles, and there would be a high cost to replace entire fleets. There could be a potential benefit for new, smaller players in the automated 3PL space, but it remains to be seen how quickly 3PL providers will adopt such technology and how fast driverless vehicles and platooning can become mainstream.

The Five Levels of Automation

At SAE Level 0 (L0)
No Automation: the human driver does everything.

At SAE Level 1 (L1)
Driver Assistance: an automated system on the vehicle can sometimes assist the human driver conduct some parts of the driving task.

At SAE Level 2 (L2)
Partial Automation: an automated system on the vehicle can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task.

At SAE Level 3 (L3)
Conditional Automation: an automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests.

At SAE Level 4 (L4)
High Automation: an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions.

At SAE Level 5 (L5)
Full Automation: the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

Truck Platooning: Truck platooning wirelessly syncs the braking systems of two trucks to enable shorter following distances. Closing the distance between trucks reduces the aerodynamic drag and improves fuel efficiency. Platooning has the potential to improve road safety and improve traffic flow.

Overall costs of freight could drop lower in part due to a 4% to 20% improvement in fuel-efficiency in platooned vehicles. Platooning tests have shown that reduced wind resistance for following trucks and lower fuel consumption can lead to up to a 60% reduction in emissions.

However, there are significant barriers to widespread adoption on roadways, including public comfort level with automated and driverless transportation.

Traffic Jam Assist: Using a radar, a truck automatically creeps forward in congested traffic situations.

Assisted or Automated Parking/Auto Docking: This technology relies on automated steering to automatically park a vehicle and/or back into a loading dock.

Technology in the Supply Chain: Automation and digitization is also affecting change within the supply chain. The Internet of Things, digitization of load boards, virtual supply chains and warehouse robotics are among the technologies transforming operations. Technologies include:

Core Supply Chain Technologies: Transportation management systems and warehouse management systems are two primary ways shippers and their 3PL providers can collect and analyze data, and their use is becoming more common in the supply chain. The majority of respondents—70% of shippers and 77% of 3PLs — reported that they are currently using core supply chain technology; 68% of shippers and 64% of 3PL reported that they plan to make future investment in the technology.

When technologies communicate, they turn data into actionable, value-added information, increase visibility and maximize productivity. Proactive information can help shape advance planning and strategic decision making to minimize disruptions. Increasing communication and collaboration between all parties within the supply chain improves the ability to plan and execute shipments, and both parties can make better decisions when they have the right information.

"Granular data related to the handling of an order and the handoff to the warehouse or the fleet, as well as the visibility out on the road and time records of deliveries, make you much more efficient and provide insight into the costs to serve individual customers or individual stops," Scollard said. "Then you can make better decisions on how you price your product in market."

Increased communication can also streamline warehouse operations between warehouse management systems and transportation management systems. The TMS can select the carrier and service level prior to processing a load so warehouse operations can be optimized.

The two systems also can uncover a better way to accurately build loads. The actual mixed-item pallet configurations from the WMS can be used by TMS to more accurately fill the trailer, increasing utilization. In addition, information from both systems can be used to understand and balance warehouse labor requirements.

One of the challenges in automating the flow of information is obtaining data and keeping it flowing, particularly when 3PLs are pulling data from multiple sources. Sometimes shippers are also unsure of what information they need to collect, which could explain, in part, this year's increase in the IT Gap.

Internet of Things: The Internet of Things, also called IoT, refers to the interconnection via the internet of computing devices embedded in objects, enabling them to send and receive data automatically. Existing building blocks of IoT include devices constantly connected to a larger network, such as smartphones or smart home technology.

Supply chain IoT offers the possibility of self-monitoring transportation fleets and buildings for proactive maintenance and increased uptime as well as the possibility of servicing rural or inaccessible areas. IoT is increasingly popular in the commercial sphere, especially for use in warehouses and logistics, and it is changing the way people shop.

With IoT commerce, smart things can make purchases on behalf of customers based on rules, context and preferences. IoT is connecting everything from coffee makers to printers, which could automatically order necessary refill items, such as coffee pods or ink, which could drive different shipping or supply chain needs.

Digitization of Load Boards: Load boards —matching systems that allow shippers and freight brokers to post loads — have moved from physical boards located at transportation hubs and truck stops to a digital, typically mobile platform, moving the load-matching, rate negotiation and other offline elements to a virtual system. The technology continues to change as providers find improved ways to connect users to a trusted network of providers.

Uber has entered into the load-matching business with Uber Freight. With the app, vetted users search for a load, tap to book it and receive a rate confirmation within seconds. Uber Freight has also said it will offer faster payment than other freight-matching systems. "We fundamentally believe that by focusing on drivers' pain points we can solve the industry's biggest challenges. Happy drivers mean happy shippers, and ultimately everyone benefits, including the end consumers of the goods," Uber Freight said in a written statement.

The word Uberization can apply to the concept, and among respondents, 20% of 3PLs and 6% of shippers said they are using "Uberization of freight" currently; 41% of 3PLs and 30% of shippers said they plan to use it in the future.

The digitization of load boards allows for more information to be transmitted faster, and load-matching algorithms are the key to help carriers and owner-operators find the most profitable loads.

Warehouse Robotics: Robotics are already in use worldwide, especially in assembly functions for manufacturers, and robots could support improved logistics processes as well as improved levels of productivity going forward. Future advances in robotics may be in automation of more complex tasks or in aiding portions of warehouse work that are burdensome for human workers but easy for robots, such as lifting of heavy totes or providing mobile transportation across the warehouse. Next-generation robots are expected to be more affordable and easier to program.

The technology will continue to evolve, and key supply chain players are working to advance it. For companies not making direct investments in robotics, rental and leasing is an option for those who want to explore the new robotic technology as it develops.

The Global Outlook: Technology is advancing rapidly across the globe. Although there is minimally capitalized opportunity in developing economies, there are large investments in leading economies.

Governments in the United States and Europe are investing in and approving exploratory development programs for autonomous vehicles and platooning.

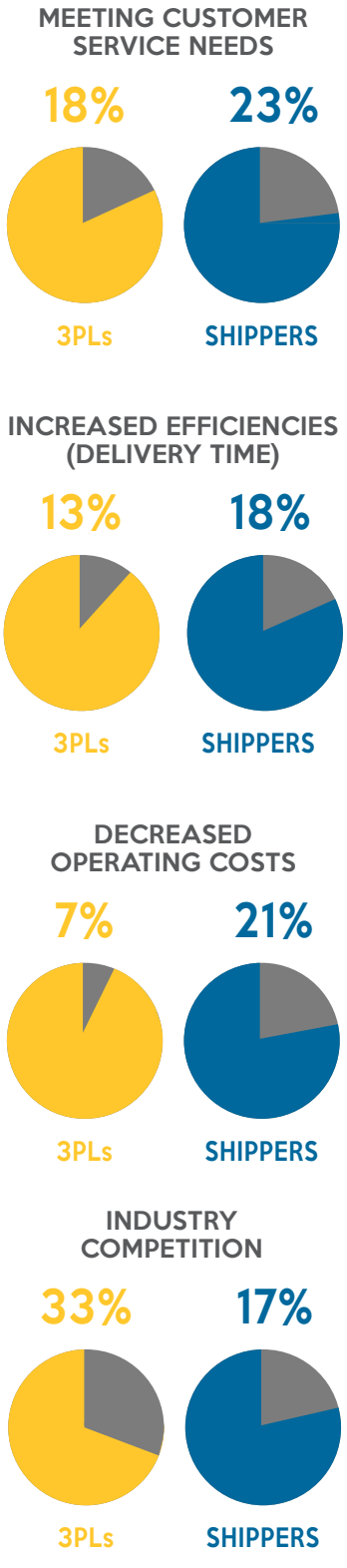
The move to IoT technology is taking place globally. Internet Solutions and Comsol Networks are partnering to create a network-agnostic IoT platform to interconnect a range of IoT networks across geographies and industries in South Africa.

Shentong Express in China has halved its human labor cost by deploying robots from Hikvision in its warehouse, which take over the tasks of sorting and delivering up to 200,000 parcels per day based on a scan of geographical delivery information.

Amazon is hosting its third annual Robotics Challenge in Japan this year, with 16 finalists from all over the globe, including India, Spain, Australia, Germany, Japan and more.

In spite ofv the developments, there is slow commercial acceptance in some areas.

FIGURE 10: WHY INVEST IN DIGITIZATION AND AUTOMATION



Benefits and Concerns of Automation and Digitization

Digitization and automation can increase efficiency, improve safety and decrease operating costs. Shippers and 3PLs both cited similar reasons for investing.

For 3PLs, competitiveness in the industry is the top reason, with 33% of respondents saying that is making them invest, shown in **Figure 10**. Among 3PLs, 18% said they are investing to meet customer service needs, 15% said it is allowing them to provide value-add services, and 12% said it is to increase efficiency and to improve time to deliver.

Among shippers, 22% are investing to meet customer service needs, 21% are looking to decrease operating costs, 18% are working to increase efficiency and improve the time to deliver, and 16% are investing because of competitiveness in the industry.

Only 4% of 3PLs and 2% of shippers said they're investing in digitization and automation to collect and analyze data even though this is an area that respondents agreed holds the most potential.

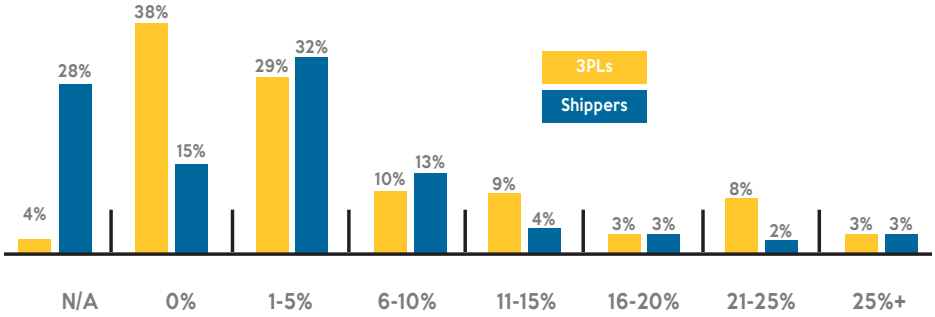
That is driving costs down for users of the technology as there are multiple players in the digitization space all competing for the largest market share. There are also inexpensive opportunities to try SaaS and small-scale solutions before full implementation.

However, technology still comes at a cost, and the majority of respondents—71% of 3PLs and 65% of shippers—are investing 0% to 5% of capital expenditures in digitization and automation, shown in **Figure 11**.

Among 3PLs, 10% are investing between 6% and 10% in digitization, compared to 13% of shippers. Only 3% of both parties said they are investing 25% of capital expenditures in digitization and automation.

When asked what is standing in the way of future automation and digitization capabilities, 25% of 3PLs and 17% of shippers cited their uncertainty in the ROI (shown in Figure 12); 21% of 3PLs and 16% of shippers cited competing core IT projects; and 13% of 3PLs and 17% of shippers blamed a lack of funding.

FIGURE 11: LEVELS OF INVESTMENT



A higher percentage of shippers—15%—cited a non-digital culture or mindset, compared to 6% of 3PLs. Other reasons for not investing in digitization and automation included a lack of in-house talent to develop, implement and monitor (12% of 3PLs and 10% of shippers); insufficient dedicated resources to develop digital platforms (11% of 3PLs and 9% of shippers); and unstable or inconsistent IT infrastructure (6% of 3PLs and 4% of shippers).

Rapidly changing technology has its benefits, but can also create challenges. The large number of companies competing in the same space may drive costs down, but it could also mean that continuity of service may be at risk at players drop out. It could also create a potential struggle to build a comprehensive adoption strategy as technology changes over time.

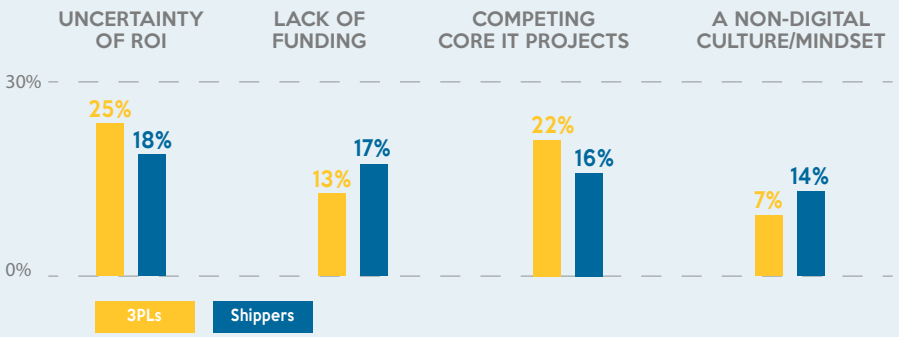
What's more, the rapid progress also means today's technologies may be obsolete next year as new players rise and fall in the digital space. That could make some shippers and 3PLs hesitant to invest in certain technologies.

Changes in Human Labor Needs

A logistics job from 10 years ago looks different than it does today and will look different in the future. Technology changes the skillsets needed by workers, and those within the logistics industry are leveraging technology to support human workers. Going forward, supply chain employees will need to adapt to the digitized workspace with a willingness to develop new skills and tap into technology. While technology won't replace the human resources within the supply chain (see related section on page 39), it can alter their responsibilities.

Digital load boards and IoT will remove certain aspects of everyday manual labor, from in-person monitoring to check-ins and scans through various points of the supply chain process. Warehouse robotics will take over aspects of distribution center picking, packing, and processing, reducing the need for unskilled labor.

FIGURE 12:
POTENTIAL ROADBLOCKS TO AUTOMATION AND DIGITIZATION



Key Takeaways

- Automation has the potential to improve safety and limit the impact of human error in transportation. Automated braking between connected vehicles in a platoon and sensing and avoidance technologies reduces risk of accidents.

- Digitization can help shippers and 3PLs with their optimization of time, resources and labor. New technology is creating greater visibility across the supply chain, which can reduce duplicated effort and createvgreater insight into advanced management, resulting in lower out of stocks, faster transportation time and lower congestion in warehouses.

- Among 3PLs, 41% said they currently use big data analytics, compared to 25.4% of shippers. However, 67% of 3PLs and 69% of shippers said they will invest in big data analytics in the future.

- The majority of respondents—70% of shippers and 77% of 3PLs—reported that they are currently using core supply chain technology; 68% of shippers and 64% of 3PLs reported that they plan to make future investment in the technology.

- Investment in technology is still low with 71% of 3PLs and 65% of shippers reporting that they are investing 0% to 5% of capital expenditures in digitization and automation. Among 3PLs, 10% are investing between 6% and 10% in digitization, compared to 13% of shippers. Only 3% of both parties said they are investing 25% of capital expenditures in digitization and automation.

- Competitiveness in the industry is the top reason 3PLs are investing in digitization and automation, with 33% of respondents citing it as the cause, 18% said they are investing to meet customer service needs, 15% said it is allowing them to provide value-add services, and 12% said it is to increase efficiency and to improve time to deliver.

- Among shippers, 22% are investing to meet customer service needs, 21% are looking to decrease operating costs, 18% are working to increase efficiency and improve the time to deliver, and 16% are investing because of competitiveness in the industry.

- Only 4% of 3PLs and 2% of shippers said they're investing in digitization and automation to collect and analyze data even though this is an area that respondents agreed holds the most potential.

- For 25% of 3PLs, uncertainty in the ROI of automation and digitization capabilities is keeping them from investing, compared to 17% of shippers; 21% of 3PLs and 16% of shippers cited competing core IT projects; and 13% of 3PLs and 17% of shippers blamed a lack of funding.

- A higher percentage of shippers—15%—cited a non-digital culture or mindset as the reason for not investing, compared to 6% of 3PLs. Other reasons for not investing in digitization and automation included a lack of in-house talent to develop, implement and monitor it (12% of 3PLs and 10% of shippers); insufficient dedicated resources to develop digital platforms (11% of 3PLs and 9% of shippers); and unstable or inconsistent IT infrastructure (6% of 3PLs and 4% of shippers).

- Digitization trends face fewer legal and developmental obstacles than automation trends, but both carry with them unique challenges. Piecemeal regulations could make cross-border transportation complex. Requirements for safe autonomous vehicle operation or platooning may not be available in all geographies and there are safety concerns during development.

RISK AND RESILIENCE IN SHIPPER-3PL RELATIONSHIPS

Real-Time Problems Require Real-Time Solutions

In today's supply chains, information flows rapidly and there are collaboration opportunities available throughout the planning, forecasting and execution phases. The real-time exchange of data allows companies to make decisions earlier, which can minimize the ripple effect of supply chain disruptions. By providing increased visibility, 3PLs have an opportunity to provide greater value.

Imagine a situation where a manufacturing facility receives an e-mail from its 3PL provider that an incoming shipment of critically needed parts or materials is experiencing a delay in-transit. In ordinary circumstances, this may not be of great concern, but if this particular shipment is not received on-time, it will be necessary to shut down the entire manufacturing process. When a production line is down, tens of thousands of dollars can be lost, and time lost equates to revenue manufacturers may never recoup. This is a very expensive consequence, and frustration begins to set in for those involved.

With this real-time example as a starting point, the *Annual 3PL Study* delved inside shipper-3PL relationships, how prepared they are to deal with uncertainties that may arise, and how they can respond to problems before they actually occur.

The focus on risk and resilience is designed to identify potential types of uncertainty that may have adverse consequences for the customer, 3PL provider or both. Also of great relevance is the need for both parties to have the resources that will enhance their abilities to act in real-time to lessen or mitigate the consequences of supply chain disruptions. Thus, and as suggested above, "real-time problems require real-time solutions," and manufacturers need to know that parts needed for production will arrive on time and in the quantities needed.

Current Situation

Based on the results of this year's global survey, 98% of shippers and 99% of 3PLs were in agreement that at present there is an increased need for 3PLs to respond to customers more quickly and with complete, accurate and consistent information. Apparently, both parties understand that there is a need for improvement, as only 51% of shippers and 50% of 3PLs feel that 3PLs communicate well in responding to risks and executing operating objectives.

The *Annual 3PL Study* found that there is a significant need for both shippers and their 3PLs to take individual and joint ownership of strategies and capabilities that will help to reduce, mitigate and eliminate certain types of risk in their relationships, and to also develop the resilience to deal with uncertainties and adverse circumstances that may occur.

To further investigate this concern, researchers addressed a number of topics that relate to the roles of risk management and resilience in shipper-3PL relationships, including:

- Structuring effective shipper-3PL relationships (input-process-output)
- Developing, implementing and benefiting from formal risk-management processes
- Understanding causes and consequences of lack of complete/accurate/consistent information between shippers and 3PLs
- Utilizing capable information technologies to create and facilitate the resilience needed to avoid and recover from adverse circumstances

Shipper-3PL Relationships

Successful relationships of any type typically require significant time, effort and commitment by the involved parties. Some, but not all, of the prerequisites to success include:

- Processes for solution design and delivery
- Focus on relevant workflows that are consistently executed across global organizations
- Timely protocols to resolve problems
- Management and top-down visibility across interconnected processes
- Reduced cycle times and process variability
- Effective communications using state-of-the-art capabilities
- Avoidance of unnecessary lapses in process connectedness and continuity
- Quantification of business rules

An interesting observation from this year's research is that while 43% of shippers think of themselves as "strategic" buyers of 3PL services (as opposed to 37% of respondents that identified themselves as tactical buyers of 3PL services or the 20% of respondents that said they are both strategic and tactical buyers), only 31% of 3PLs feel that their customers manage them like a strategic partner.

This may be a first sign of a less-than-perfect relationship where the parties have different thoughts about the role each is to play. Also, it was clear from the research that shippers have a much higher opinion of their abilities to "manage" 3PLs than the 3PL respondents say they have.

Figure 13 illustrates some of the types of interaction and coordination that need to occur at different times between shippers and 3PLs. Using 30 weeks as an overall example time frame, there is a logical flow of processes and activities that relate to the need for effective planning, forecasting and execution. Additionally, there is a rising sense of urgency as the overall process moves toward timely execution in a real-time perspective. As such, the primary focus of the special topic research is on risk and resilience in the execution stage of this framework.

Risk Management

To bolster an understanding of risk management, it is helpful to consider the "3-Rs" of 3PL-shipper relationships: risk, resilience and recovery. Collectively, these are the three key elements of the continuous cycle that help to understand, quantify, mitigate or eliminate, and then recover from certain types of risk.

Well-accepted steps in most risk management processes include some versions of: 1) process planning; 2) risk identification; 3) analysis and evaluation; 4) mitigation or elimination; and 5) evaluate and improve. Overall priorities focus on the needs to move from being reactive to proactive and then to innovative.

Among the findings from this year's survey are that 68% of shippers agree that the 3PLs they use generally have an agreed-upon framework for risk assessment within their organization, whereas 52% of 3PLs indicate they have these capabilities.

FIGURE 13: 3PL-SHIPPER PLANNING FRAMEWORK

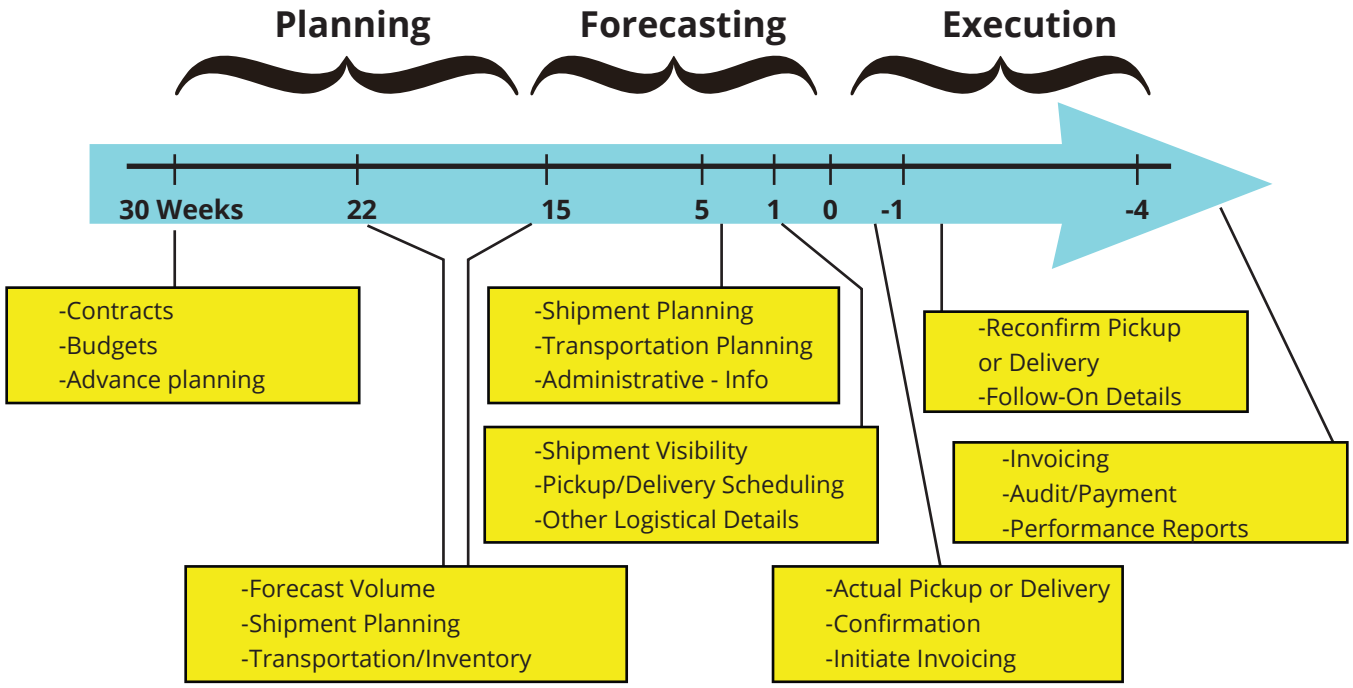


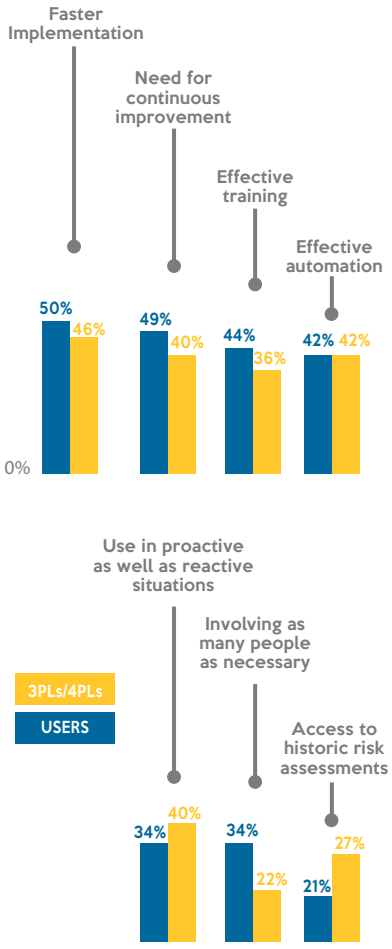
Figure 14 indicates the responses of shippers and 3PLs when asked about areas where 3PLs need to improve in their risk assessment processes. Improvement areas cited by shippers include: need for continuous improvement (49%), faster implementation (50%); faster implementation (50%); effective training (44%); and effective automation (42%).

When comparing these percentages with those from 3PL respondents, it is apparent that larger percentages of shippers see the need for pursuing these areas for improvement. Of greater significance, however, is that priorities on faster implementation, effective training and effective automation each focus on the need for higher levels of capability and responsiveness in the real-time, execution stage of the relationship.

Two additional thoughts may help to better understand how shipper-3PL relationships may be able to successfully deal with certain types of risk. First, by working with 3PLs that have real-time data visibility, shippers can monitor specific key performance indicators to make sure pre-determined and agreed-upon performance specifications are met. A related benefit of this type of 3PL-based technology is that shippers do not have the burden of continuously investing in supply chain technology to keep up with industry innovation.

Second, in the case of either business upswings or downturns that may be experienced by shippers, the use of 3PLs can help to quickly achieve the needed scalability to effectively accommodate these changes. Developing this type of capability requires significant advanced planning, but it can be

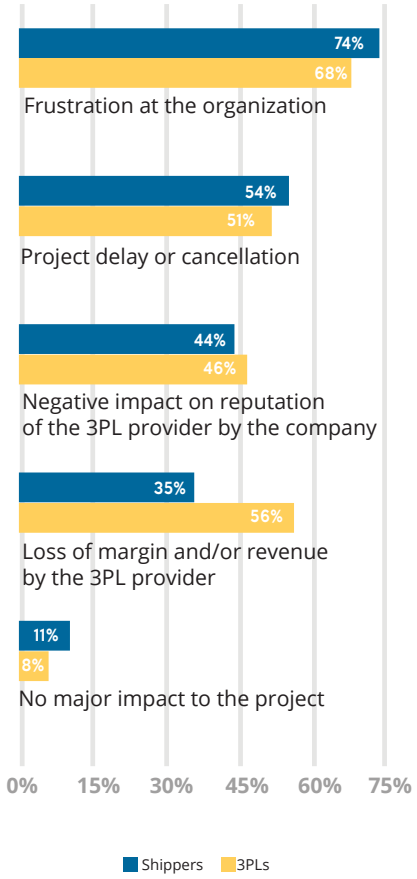
FIGURE 14: AREAS FOR IMPROVEMENT IN RISK ASSESSMENT PROCESSES



Areas for Improvement

Interestingly, 64% of shippers and 79% of 3PLs report that they have been involved in projects where the ability to execute quickly was directly impacted by lack of complete, accurate, and consistent information having been provided by the shipper. **Figure 15** indicates some of the consequences that were reported by survey respondents when having to deal with these types of concerns.

FIGURE 15: UNDERSTANDING CONSEQUENCES RESULTING FROM INSUFFICIENT/INCOMPLETE INFORMATION

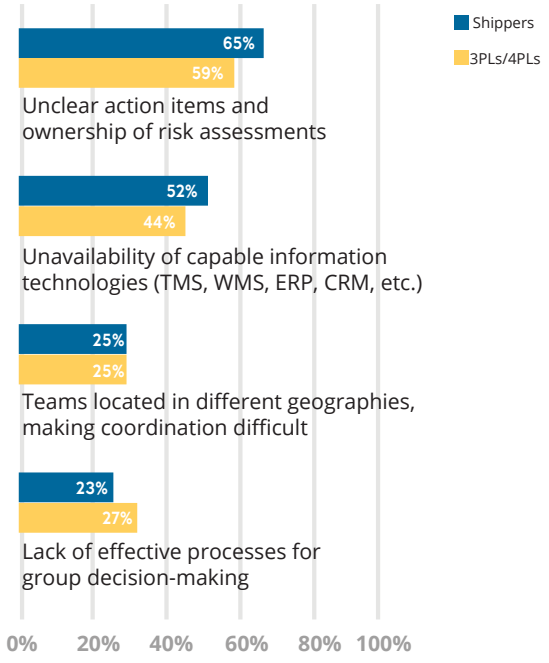


Obviously, these situations can cause frustration on the part of shippers and 3PLs, but more impactful consequences are seen to include project delay or cancellation, negative impression of the 3PL by the shipper organization, and loss of margin and/or revenue by the 3PL provider. Also, there are small numbers of respondents who indicated no major impacts resulted from this type of situation.

An interesting perspective is provided in **Figure 16** that identifies primary causes that may prevent 3PL providers from making needed decisions in a timely manner. The most prevalent of these is lack of clarity and ownership of needed information. Also of significance are circumstances where capable internal systems such as TMS, WMS, CRM, ERP, etc., are unavailable. One related consequence here is that it is difficult for 3PLs to have a "single source of truth." This may be interpreted as a reference to 3PLs finding it difficult to deal with multiple and conflicting information sources.

In one of our focused interviews, John Golob, CEO of Lanetix Inc., suggested that a great deal of the delays in responding to (much less anticipating) customer issues comes from inconsistencies in data. For example, in a 3PL organization, the business development team has one understanding of the deal they priced, solutions has another definition of the project's success and finally, finance sends an invoice that reflects the 3PL's price list, not the solution that was conceived by business development and delivered by operations. Clearing up these inconsistencies accounts for a great deal of the delays and in turn, represents a significant risk to gross margin.

FIGURE 16: SHIPPERS/FACTORS IMPACTING TIMELY DECISIONS RELATING TO RISK ASSESSMENTS INVOLVING 3PLS



Managing Critical Interfaces Connecting Shippers and 3PLs

While there are numerous types of important interfaces that connect shippers and 3PLs, those of greatest immediate consequence occur in the execution phase of the relationship. One of these interfaces is that of direct communications between shippers and 3PLs, which participants at the study workshop said can sometimes be lacking.

Figure 17 squarely focuses on several root causes of problems that may be incurred. Examples included:

- Use of email for communications. There are many occasions when the use of email may be very effective, but there may be impactful delays in becoming aware of and responding to critical information transmitted by email, especially when sorting through lengthy email threads with multiple versions of attachments.
- Lack of context in emails or phone calls, not only between shippers and 3PLs but within 3PL stakeholders, such as business development and operations.

- Lack of collaboration hub or digital workspace. These types of resources can significantly facilitate and enhance the effectiveness of communications between shippers and 3PLs. Discussions with workshop participants confirm that the capabilities can be a valuable means to effectively transfer urgent and real-time information and requests.

- Unclear or changing internal organizational structure. This may result in some wavering and/or variability in the ability of internal structures at either shipper or 3PL firms to communicate effectively in a timely manner.

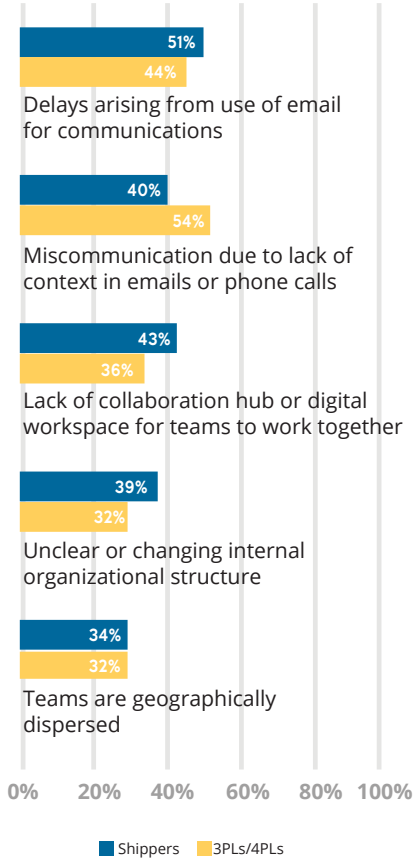
- Geographically-dispersed teams. Although some of the technologies discussed above can help to improve the effectiveness of communications between shippers and 3PLs, there are still examples where the geographical dispersion of organizations and people involved may be a hindrance.

Other root causes suggested by shipper survey respondents included: high workloads, lack of time and/or detail to respond properly, a lack of experienced and capable talent, and the need for clear understanding of risks, and the sense of urgency and cost maintenance.

Those mentioned by 3PL survey respondents included: a lack of modeling tools to determine capacity needs, incomplete, inaccurate and inconsistent information, diversity of mindsets and skillsets, lack of available data, silos and turf wars that limit collaboration, different philosophies on legal risk, and rapidly changing goals.

Discussions at the study workshop session highlighted the need for accurate and capable systems and technologies and for objective decisions based on data. Also, the capabilities of KPI tracking systems represent a useful resource for shippers to document specific requirements that may result in their requirements being met by 3PLs. Examples of these requirements include shipment tracking/delivery dates, order processing updates and real-time fulfillment information prior to shipping, and assistance with customer inquiries and insightful responses to help mitigate issues.

FIGURE 17: EXAMPLE ROOT CAUSES OF COMMUNICATIONS ISSUES WITH 3PL/4PLS



Last, as shippers are trusting 3PLs with their "brand," there is a great need to develop strong and effective relationships with delivery partners. The ability to promptly become aware of lost or damaged shipments is necessary to maintain the highest standards of the fulfillment process. Another imperative for 3PLs in today's competitive and fast-moving business environment is to provide customers with real-time visibility into inventory and order shipment status worldwide.

The Future

There are a number of perspectives and issues that are central to creating and improving the effectiveness of essential interfaces between shippers and 3PLs. As indicated previously, these may be in the context of the processes relating to planning, forecasting and execution.

One ancillary topic that deserves further attention at a future time is that of how we achieve better results with the people, process and technology resources that may be available.

One suggestion is to take a close look at the thinking of Gen. Stanley McChrystal as discussed in his recent book titled *Team of Teams: New Rules of Engagement for a Complex World*. His thesis for innovation is to challenge the effectiveness of many "command and control" systems, and instead to consider giving small groups the freedom to experiment with a concept referred to as "team of teams."

Essentially, this tears down the silos between functions and process areas within the organization, and creates greater flexibility and responsiveness to deal with problems as they emerge. The tie-in with the topic of risk and resilience is that this concept may have valuable applicability to the challenge of effectively managing execution-related priorities in a real-time environment.

Key Takeaways

- Both shippers and 3PLs almost unanimously agree that there is a need for 3PLs to respond to customers more quickly and with timely, accurate and consistent information. To accomplish this, both parties need to take individual and joint ownership of strategies and capabilities that will help to reduce, mitigate and eliminate certain types of risk in their relationships. They must also develop the resilience to deal with uncertainties and adverse circumstances that may occur.

- There is a gap between the percentages of shippers that think of themselves as "strategic" buyers of 3PL services (43%), with only 31% of 3PLs reporting that they feel customers manage them like a strategic partner. In addition, 74% of shippers indicate they have formal plans to manage 3PL relationships but only 42% of 3PLs say formal plans to manage relationships, exist.

- Time horizons are important to developing appropriate strategies and tactics to deal with risk and resilience. While longer timeframes are suggested by the needs for planning and forecasting, the most critical need is to develop effective capabilities for the execution, or real-time, phase.

- There is no shortage of suggestions as to how both shippers and 3PLs may improve their practices in relation to risk and the resilience. Among the highest priorities are need for faster implementation, effective training and effective automation.

- Both shippers and 3PLs can experience a range of consequences when information at the shipper-3PL interface is not complete, accurate or consistent, including frustration at the organization (74% of shippers and 68% of 3PLs) and project delays or cancellation (54% of shippers and 51% of 3PLs).

- More 3PLs (79%) than shippers (64%) reported that they have been involved in projects where the ability to execute quickly was directly impacted by lack of complete, accurate, and consistent information having been provided by the shipper.

- More than half of shippers (59%) and 3PLs (65%) said unclear action items and a lack of ownership may impact 3PLs' abilities to make decisions in a timely manner. Similarly, 52% of shippers and 44% of 3PLs said the unavailability of capable internal systems, such as transportation and warehouse management systems and enterprise resource planning, would impact decision making.

- Recommendations for improvement include greater clarity of action items and ownership of processes and decisions that may facilitate as well as the availability of capable, connected internal systems.

- Also cited as key areas for exposure to risk in the execution phase are problems and limitations of email correspondence when trying to deal with real-time problems (51% of shippers and 44% of 3PLs), a lack of context in emails or phone calls (40% of shippers and 54% of 3PLs), and lack of collaboration hubs or digital workspaces (43% of shippers and 36% of 3PLs).

- An interesting parallel to the topic of dealing with risk and resilience is the idea of replacing "command and control" capabilities with a move to developing "teams of teams." This concept was popularized by Gen. Stanley McChrystal in his recent book titled Team of Teams: *New Rules of Engagement for a Complex World.*

LOGISTICS TALENT REVOLUTION

The Human Asset Powering and Leveraging the Upside of Technology Disruption

In today's landscape of seemingly limitless and often virtual networks of suppliers, manufacturers and customers, success hinges on an effective supply chain. As a result, the role of supply chain leaders and logistics executives is taking on greater importance as companies work to build more efficient and technologically advanced supply chains. Technology has emerged as the linchpin of the supply chain, and that technology is advancing at a rapid pace, enabling companies to do more in less time.

At the same time, technology is reframing the demands on the workforce, and while it is natural to think automation will decrease the need for companies to invest in employees, the opposite is true. Technology won't replace human talent within the supply chain. Instead, it will enable employees to reach their full potential and make human talent even more valuable.

Technology will help employees recognize greater potential and take care of certain tasks so that talent can push further, and it is human talent that is the key factor linking innovation. People outperform even the most sophisticated technology, and as people grow in knowledge, experience and seniority, they bring even more value to the business. However, machines operate at a limited maximum output and depreciate over time, according to a study commissioned by Korn Ferry and the Centre for Economic and Business Research, a British economic consultancy.

The study found that globally, human talent—people, labor, knowledge—will be worth as much as $1.2 quadrillion over the next five years whereas physical capital—inventory, real estate and technology—will be worth an estimated $521 trillion, showing human talent, intelligence and capital is far more valuable than physical capital.

Human talent is also the greatest value creator available to organizations, the Korn Ferry study found. For every $1 invested in human talent, $11.39 is added to GDP, proving that investing in people can generate value for the organization over time that significantly exceeds initial financial outlay.

Technology is upping the table stakes for participants to be successful, particularly in the supply chain industry. Supply chain executives are increasingly shifting from physical efficiency to data efficiency. Data collection, analytics, increased visibility and the ability to react quickly all rely on increased technology within the supply chain; logistics leaders will have to handle highly complex operations.

One of the biggest changes for logistics officers will be shifting from physically moving loads and products around the world to using data to effectively manage the entire supply chain, from procuring a raw material from a supplier to sending a finished product to a customer. As those within the supply chain increasingly use data to drive both real-time and long-term decisions, tomorrow's supply chain professionals will have to become comfortable interpreting insights from the faintest of signals.

Today's supply chain leaders are already relying on a general business sense and have a deep knowledge of the company's overall operations and an understanding of how the rest of their companies work, particularly how fast it takes to bring a product to market and how quickly the company can pay its invoices. This need for both general and specific knowledge will continue to apply to future supply chain leaders.

The supply chain has a big influence on a product's time to market, a customer's overall experience and other key metrics that are tied to a company's success.

Supply chain leaders must understand all aspects of an end-to-end supply chain, and adapt as technology creates new opportunities. Within the supply chain, analytics went from descriptive to predictive and now to prescriptive. Leaders must be able to leverage that to elevate their operation.

Logistics executives must be effective communicators to position themselves as master collaborators with every part of their respective organizations. They may need to speak the languages of the IT, finance, research and development, operations and human resource departments. The future supply chain leader provides critical input on branding, design, contract management, manufacturing and storage. This type of collaboration can only be applied by human talent and is not something automation can handle.

The importance of supply chain professionals having more general business acumen is causing a shift in the relationship of the C-suite too. Chief supply chain officers need to have full connections to the CEO and chief financial officers, which may not have been present before.

The Logistics Executive of the Future

Top supply chain executives can generally handle the most complex problems and show a preference for developing strategic, long-term solutions. Successful leaders within the industry are eager to drive success using best practices and researched messages but avoid being stifled by fear of risk of failure. This is all underpinned by a healthy focus on results, willingness to drive change, and a push to deliver on challenging goals. Leaders can operate independently and creatively on a variety of objects.

The DNA of a future leader has three key strands: agility, visionary, and partner/collaborator. They will need to be able to manage ambiguity, make situational adaptations and pivot with constantly changing environments. Companies with highly-agile executives have 25% higher profit margins than their peer group.

Learning agility (the ability to extract principles from previous experiences and

effectively apply those in new settings) and emotional intelligence (the ability to understand and manage one's own emotions and understand and influence those of others) are also high predictors of success.

Because technology, supply chains and business environments are constantly in flux, leaders will have new skills to master and systems to learn throughout their careers, so the ability to take on and understand new concepts will make or break the ability of that leader to excel in the future state of supply chain.

Emotional intelligence is also a trait of decisive quality leaders. They will be driven by and need to be comfortable in situations where predictability and structure may be varying or even low and are the most engaged when there is newness and unpredictability. In this environment, high emotional intelligence in a leader is manifested by their ability to maintain their own self-awareness, social awareness, self-management and relationship management.

Visionaries are able to engage and inspire others within the organization as well as their shipper partners. They have pre-emptive instincts and the ability to see around the corner to prepare for changing demands.

As a partner and collaborator, supply chain leaders will have the ability to work with others to obtain the expertise they need and have a natural affinity for developing their own expertise in several areas. They will use their communication skills to find the information from within the organization to make the operations a success. For example, supply chain leaders won't be expected to code the technology that powers the supply chain, but they will need to be capable of partnering with the IT departments and working with teams devoted to creating and customizing the technology.

Top supply chain executives are comfortable with minimal processes and procedures and utilize an effective influencing style, calm demeanor under pressure and credible communication style. They show concern for the impact that they have on people around them, and reflect on how to better adapt to diverse people and situations. While generally self-aware, top executives might not always adapt and adjust their approach for every unique situation. They thrive in environments that value networking, team-building and collaboration, but under pressure, may gravitate towards focusing on tasks.

Because of the changing requirements of the role, the paths to the chief supply chain officer positions of the future can differ and often leaders emerge from a non-linear, multidirectional, varied career path. Individuals could rise through information technology, research and development/ engineering or operations.

In some industries, there has been a shift towards procurement-focused individuals for the chief supply chain officer, particularly in commodity driven businesses. But even then, they are looking for more "well rounded" individuals that have come up and had experience leading IT, R&D/engineering and operations.

Technology will also enhance and improve the job outlook for those within the logistics workforce—not just within the key leaders at the top—creating more diversity in roles for people on the ground. This drives the need for leaders to understand the different aspects of newly created positions.

Amazon has said its increased automation in its distribution centers has created more work for people. In an article in the Houston Chronicle, the online retailer said that while robots will speed up the amount of inventory prepared for shipping each day, more human labor is needed to meet growing demand and speed up delivery throughout the region.

Companies of the Future

Given the rapid advancement of technology and changing consumer and business expectations, companies that can convert disruptions into engines for growth and transformation will be the most successful. Competing in this landscape can come down to the strength and agility of the business's supply chain, which is quite possibly the company's differentiator, rather than its cost center.

Supply chain technology, for example, can allow 3PLs to gain a strategic advantage. Not only can it cut down the time to delivery but also drive new business models. Information will need to be easily accessible and those within the industry will have to find new ways to connect the data to end users.

Shipper expectations have changed and they are seeking out more data and analytics than ever before. Their increasing expectations is evident in this year's IT Gap, discussed on page 11. Simply having visibility is no longer enough, and more and more are looking for logistics partners that can use technology to drive network efficiencies and create a competitive advantage. They are also using technology as a means to meet increasing customer demands and drive sales. This could change the types of employees 3PLs hire.

Blockchain technology, which is addressed earlier in the study, provides new opportunities and requires additional information from those in the supply chain to capture and audit information. Walmart has announced plans to use blockchain to ensure food safety in certain parts of its supply chain (see page 13).

This trend towards greater digitization and automation will create the opportunity to leverage time and human brain power more efficiently and at a higher level.

Acquiring Talent

Some organizations struggle to infuse the required traits of tomorrow's supply chain executive, but shippers and 3PLs that understand the current and future state of the supply chain industry can deploy strategic workforce planning. That process and approach is a critical path to leveraging the right workforce, today and tomorrow, at the right cost.

Strategic workforce planning is the alignment of a company's business and talent strategy and mapping the workforce needs to that strategy. Talent strategy has become a non-negotiable as technology disrupts the supply chain at an unprecedented pace, and the skills, supply and location of talent are all in flux.

The talent needs of a supply chain workforce do not behave in linear fashion. So, even once it's clear what the future workforce needs to look like, achieving it is no easy task. Mapping how to get there requires a deep understanding of the current workforce, sophisticated scenario planning, detailed HR analytics and suitable modeling tools. In addition, because supply chain conditions change swiftly, talent strategies will have to be reviewed and updated regularly to account for opportunities and threats as they arise.

The key to future success within the supply chain is a blend of technology and human talent assets, and talent will take a lead role.

Key Takeaways

- Technology is advancing at a rapid pace, enabling companies to do more in less time. That technology is reframing the demands on the workforce, and ultimately increases the need for companies to invest in employees.
- Technology will help employees reach their full potential and make human talent even more valuable.
- Technology is changing the skillsets required to be successful, particularly in the logistics sector.
- As a partner and collaborator, supply chain leaders will have the ability to work with others to obtain the expertise they need and have a natural affinity for developing their own expertise in several areas.
- The DNA of a future leader has three key strands: agility, visionary and strategist, and partner and collaborator.
- The paths to the chief supply chain officer positions of the future can differ and often leaders emerge from a non-linear, multidirectional, varied career path. Individuals could rise through information technology, research and development/engineering or operations.
- Technology will also enhance and improve the job outlook for those within the logistics workforce—not just within the key leaders at the top—creating more, and different types of roles for people on the ground which drives the need for leaders to understand the diversity.

CONTEMPORARY ISSUES

As part of the Annual Third-Party Logistics Study, the study team reviews contemporary supply chain topics that are of relevance to shipper-3PL relationships. This year's topics, which include third-party logistics in China, managing supply chain costs, the role of logistics in humanitarian efforts and the greening of the supply chain, were identified through the team's interaction with shippers and 3PLs in discussions, interviews and workshops.

Third-Party Logistics Use in China

As the demand for logistics has risen steadily and logistics services have become more professional, third-party logistics has grown rapidly in China. As reported by Armstrong & Associates, Inc., China's total 3PL revenues for 2015 were the largest in the world. While there are still many challenges existing in China's 3PL sector, its acceleration is foreseeable as the country's economy continues to grow and supportive policies are continually implemented.

Drivers of Third-Party Logistics Development in China

The past decade has evidenced various forces that have helped the 3PL industry in China to develop in terms of both magnitude and diversification. Continued growth of the economic aggregate in China has helped to create significant demand for third-party logistics services. Also, many enterprises have focused on their core competencies and have improved their speed-of-market response by outsourcing some or all of their logistics operations.

The manufacturing industry in China has seen significant transformation and upgrading, which has led to greater requirements for professional logistics services. Consumer demand also has increased rapidly, and there has been greater need for fast-moving consumer goods (FMCG), cold-chain goods and high-quality foreign commodities. As a result, higher standards have evolved in terms

of timing, quality and safety, professional logistics services, and cross-border and e-commerce supply chain capabilities.

Another contributing force in China is the recent rampant growth of chain commerce—a form of commercial operations in which certain shops in the same industry are linked by joint stock replenishment and operating technologies to improve the economy of scale.

Because chain distribution operations are more complex and have high requirements for enhanced logistics, information technology and management capabilities, they have fueled the growth of diversified professional third-party logistics services. Accordingly, a number of e-commerce platforms have emerged, including Alibaba, Taobao and JD, which in turn have triggered a plethora of business models such as business-to-business, business-to-consumer, consumer-to-consumer and online-to-offline commerce. The e-commerce market size keeps expanding and online shopping is experiencing significant growth.

China's government policies also have encouraged and supported the development of third-party logistics. Some of the principal purposes of these policies include:

- Encourage manufacturers to move from corporate logistics to commercial logistics.
- Support logistics service providers to become more professional, optimize their dispersed logistics resources, and improve their integrative solutions.
- Engage in developing e-commerce services and internet finance.
- Entice private investors to consider 3PLs.
- Afford more favorable terms for land usage and financial arrangements, and to facilitate international competitiveness through the formation of transnational logistics collaborations.

Current State of Third-Party Logistics in China

The 3PL market has grown steadily in China with more diversified enterprise types, stronger corporate strength, expanded service fields and extended service value chains. At the same time, 3PLs are speeding up synergetic collaboration with relevant industries while making innovations in service models and business structures. There are several notable aspects of the current state of third-party logistics development in China, including the size, types and value.

Third-Party Logistics Market Size Ranking No. 1 in the World

China's total logistics expenses keeps growing, while total revenue in the 3PL sector rises steadily. As estimated by Armstrong & Associates Inc., the 3PL market size in China for 2015 accounted for about 10% of China's 2015 logistics cost. Total revenue accrued in the 3PL market stood at $162.8 billion U.S., ranking No. 1 in the world. This exceeds that of the U.S. by $1.6 billion U.S., accounting for 55.7% of the total revenue of the Asia-Pacific region, and amounting to 20.6% of the total world revenue.

Enterprise Types of 3PLs are Becoming More Diverse

Most 3PL providers in China originated from enterprises in traditional transport, warehousing and cargo agency. Some 3PLs are spin-offs from logistics services of manufacturing enterprises and there also are 3PL firms that were established by merging the logistics resources of several enterprises. In addition, there are some newly-established 3PL companies that have been developed in response to customer and market needs.

In terms of ownership, there are a number of state-owned 3PL enterprises that not only have extended logistics networks and ample resources in China, but also explore international markets to become cross-border logistics conglomerates. Also, there are foreign-funded 3PL enterprises that have become leaders in comprehensive logistics services and advanced supply chain management in China.

The scope of services provided by these 3PLs varies. While some focus on transport or warehousing services, others are expanding their service functions to become comprehensive 3PL providers. While the majority of 3PLs in China are primarily asset-based, recent years have seen an increase in non-asset owning third-party organizations.

Strength and Service Offerings of China's 3PL Industry

Enterprises Enhanced Considerably. Essentially, 3PLs in China have been responsible for developing a sprawling service network system that covers China and spreads across the globe. Also, there has been growth of nationwide operations and information networks. Strategic alliances have developed between 3PLs and major global manufacturers. Some of China's large 3PL enterprises have gradually expanded their service scope to diverse fields such as FMCG, energy, food, automobile manufacturing, ICT and high-tech. Also included are one-stop supply chain solutions services and comprehensive financial services featuring payment, financing and wealth management. Also, China's 3PL industry has seen marked advancement in professional and customized service capabilities in industries including automotive, home appliance, cold-chain, and engineering and project logistics.

Extended Service Value Chain of 3PL Enterprises

The service value chains of 3PLs in China continue to extend both downstream and upstream in supply chains to provide diverse, integrated and holistic services for the clients. Comprehensive transport and warehousing logistics still constitute the fundamental logistics service functions of a majority of 3PLs. As logistics providers improve their IT competency, they are able to provide valuable logistics information services to their clients. In addition, more and more 3PLs are actively pursuing value-added logistics services such as logistics-and-finance services and integrated supply chain management services to their clients.

Development Trends of China's 3PL Industry

The 3PL industry has realized the opportunities and benefits of working cooperatively with other related industries. Some examples are highlighted below:

- Visible efforts have been taken by 3PLs to work closely with manufacturers, thus reaping synergetic benefits by optimizing processes, improving efficiency and innovating innovative operational models. For example, there is a relationship between a state-owned company of China and various steel manufacturers that adopted the supply chain practice of joint stock management to help the manufacturers effectively reduce the cost of capital outlay.

- Some 3PLs are working closely with Amazon Global Selling to provide one-stop, door-to-door service for Amazon sellers covering major developed countries such as the U.S., Japan, United Kingdom, France, Germany, Italy and Spain.

- 3PLs are exploring collaborative business opportunities with several other industries. For instance, to help a large beverage company in the U.S. solve the problems pertaining to the sugar suptply chain, such as price fluctuation and high stocking cost, one company proposed a comprehensive solution to integrate logistics and supply chain finance, forming a synergetic relationship among the beverage producer, the raw materials suppliers, the logistics enterprise and the bank.

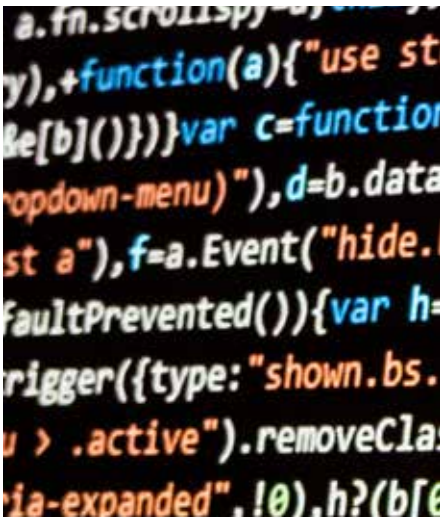
Innovations in 3PL Service Models and Industrial Forms

Third-party logistics providers are actively engaged in building high-end supply chain integrated service platforms, creating in-depth online and offline collaborations, and developing innovative service models, thus preliminarily advancing a high-end logistics industry. Examples of innovations include:

- One company has built a "logistics + internet + finance" business model and developed an intelligent highway logistics network operating system in China.

- Another has linked its offline highway hub ports with an online cloud service platform. By adopting the "internet + production base + upstream warehouse/downstream shop + front shop/rear factory" model, it has built an eco-circle of intelligent industries.

- A third company has developed a global integrated supply chain service platform cored on production supply chain services, consumption supply chain services, global purchase center, product integration supply chain services and supply chain financial services.



Challenges and Development Trends of Third-Party Logistics in China

Amid rapid growth, China's 3PL industry is confronted with many fundamental problems relating to scale of enterprises, service capabilities and quality, and cost of operations. While China is transforming and upgrading its economy, and adjusting its economic structure, the Chinese Government has been providing greater emphasis on the development of logistics. In 2014, the Government issued a number of policies to promote a holistic development of the logistics industry. In particular, the Medium and Long-Term Development Plan of Logistics Industry (2014–2020) was issued, marking that the logistics sector has been elevated to a national strategic industry. As China continues to implement its latest plan along with a number of relevant policies, the pace of 3PL advancement will be accelerated. Logistics enterprises, propelled by emerging logistics business models will become more versatile and international.

Challenges in the 3PL Industry

Compared with developed nations, China has few 3PLs that are globally known and influential, and China's 3PL industry is low in market concentration. According to the 2015 data published by Armstrong & Associates Inc., total revenues of the largest 3PLs in the U.S., represents 0.91% of the nation's 3PL market. In comparison, the index for China's leading organization is only 0.45%, evidencing a much lower market concentration level of the logistics industry in China.

Most 3PL enterprises in China focus primarily on providing clients with basic logistics services, such as transportation and warehousing. Although there is a priority on developing value-added, end-to-end supply chain services, significant opportunity remains for future development of high-end logistics and integrated supply chain services. Relatively high operating costs and low profitability still hamper the sound development of 3PLs in China. High logistics cost is attributed to negative factors such as: the small size of many 3PL enterprises, segmented and poorly-coordinated administrative/regulative institutions, developing infrastructures and ever-rising resource costs. Meanwhile, profitability suffers due to fierce price competition among numerous logistics firms offering undifferentiated, low value-added services. Combating the high operating cost and attaining higher profitability are certainly crucial issues for promoting a sound development of the third-party logistics industry in China.

Development Trends of the 3PL Industry.

Noting the prevalence of small firm sizes and low market concentrations of 3PL enterprises in China, one of the three main themes in the Medium- and Long-Term Development Plan for Logistics Development (2014-2020) is to "focus on improving the scale and intensive development of logistics enterprises." As a result, the government is concertedly fostering logistics enterprises to bulk up in the form of shareholding, mergers and acquisitions, and alliances. Through mutual efforts of the government and the enterprises, it is expected that a number of sizable logistics firms featuring advanced technologies, modern management capabilities, strong core competitiveness and prominent business reputation will be cultivated.

Many 3PLs in China are fully aware of the power of the internet, big data, cloud computing, artificial intelligence and other emerging technologies in facilitating the transformation and upgrading of business models. A multitude of technology-advanced logistics models, such as the "internet + vehicle/goods compatibility," the "internet + cargo agency," the "internet + drop and pull transport," the "internet + contract logistics," the "logistics + internet + finance," the "logistics + internet + big data," and many other "internet+" genre of innovative models have sprung up. Judging from the enthused adoptions of similar advanced technologies, other highly-efficient intelligent supply chain integrated platforms, vehicle-free carriers and new innovative business models are likely to be adopted and proliferated among pioneering 3PLs.

Another arena of future development for China's 3PL industry is that of internationalization. As the Belt & Road Initiative—a development strategy proposed by Chinese President Xi Jinping that focuses on connectivity and cooperation between Eurasian countries—is being implemented, it will bring about massive improvements in infrastructure, deepen the trade relationships among large numbers of nations and significantly help to grow global logistics activities. The Chinese government, in consort with the Initiative, will actively push forward cooperation and exchanges between domestic logistics providers and world's leading 3PL organizations. Forward-looking 3PLs in China will undoubtedly embrace the immense opportunities accompanying the Initiative in expanding their scope of internationalization development.

How will the 3PL industry in China alter the 3PL outlook worldwide? What type of growth will we continue to see among 3PLs in China? How will 3PLs and shippers address challenges and what type of innovative solutions will they create? In what ways will the Chinese government help to move the logistics industry forward?

(NOTE: The content of this section was developed by researchers at Nankai University, Tianjin, Peoples Republic of China, speci cally for inclusion in the 2018 22nd Annual Third Party Logistics Study. Contributors of this material are: Ling Wang, Shao-ju Lee, Jun Liu, and Jian-hua Xiao; all from The Research Center of Logistics, Nankai University, Tianjin, People's Republic of China. Full coverage of the 3PL development in China will be a chapter in the book 2017 Contemporary Logistics in China to be published by Springer. The 3PL study team is very appreciative of this significant contribution to this year's report.)

Meeting Consumer Needs While Managing Supply Chain Costs

Consumers are demanding fast, low-cost shipping, but getting products into people's homes and keeping fresh products on the shelf is expensive. By drawing on data to create efficiencies, taking a holistic approach to the entire network and testing creative solutions to manage the final step in the delivery process, those within the supply chain are improving service while also driving out costs.

Retailers are using reliable supply chains and trustworthy timely data to help keep inventories low, which frees up capital and eliminates costs associated with storing product. Trust in the supply chain, which is typically achieved through increased visibility, is allowing shippers to utilize a flow-through model where products are never at rest.

Shippers are moving from one-million-square-foot warehouses to to smaller centers with demand-driven and built-to-order inventory levels, which is made possible by the reliability of the supply chain.

Companies are working to keep inventory levels down while also building more, smaller distribution centers, making speed, virtual supply chain modeling and demand forecast planning processes even more important.

Amazon has announced 14 new fulfillment centers in 10 states as of August 2017, which is part of the online retailer's strategy to cut shipping costs. In 2016, the company built 26 fulfillment centers, Brian T. Olsavsky, Amazon's chief financial officer, said in a call with shareholders. "A failure to optimize inventory in our fulfillment network will increase our net shipping cost," the company wrote in its annual report for 2015 filed with the Securities and Exchange Commission.

To help manage shipping costs, Amazon is building up its own shipping operation. Earlier this year the online retailer said it plans to build its first air cargo hub to accommodate its growing fleet of planes. The hub will be located at the Cincinnati/Northern Kentucky Airport in Hebron, Kentucky. Amazon began leasing planes from air freight companies, has its own fleet of 4,000 semi-trucks for long-haul ground transportation, and operates its own network of couriers making deliveries in major urban areas, *Business Insider* reported.

Whether shippers are investing in their own networks or relying on 3PLs, increased information allows shippers and transportation and logistics providers to make decisions earlier in the process, such as changing a truck's path en route to avoid congestion, intercepting a load if a disruption occurs or making decisions about preferential sourcing when it takes place. A holistic approach can allow 3PLs and shippers to find the most economical shipping method or avoid increased fees for rush deliveries.

Information and increased visibility also allows shippers and their 3PL partners to create a responsive supply chain, which can help them speed products to market and flex either up or down based on market demand.

Retailers are also testing new solutions for the final-mile delivery, including enticing customers to pick up online orders in the store for a discount. Walmart offers a pickup discount on eligible, online-only items that customers buy online and ship to any Walmart store. "We're creating price transparency to empower customers to shop smarter and choose what's best for them. Now, they can either pick up and save even more money, or ship two-day for free to home, without paying for a membership," said Marc Lore, CEO of Walmart U.S. eCommerce.

Walmart has also asked store employees to deliver online orders to customers at the end of their shifts and is testing the model in three locations. "Not only can this cut shipping costs and get packages to their final destinations faster and more efficiently, it creates a special win-win-win for customers, associates and the business," the company wrote on its blog.

Walmart has 4,700 stores across the U.S. and more than a million associates. "Our stores put us within 10 miles of 90% of the U.S. population. Now imagine all the routes our associates drive to and from work and the houses they pass along the way. It's easy to see why this test could be a game-changer," the retailer wrote.

Reverse logistics can be costly, and some retailers are working to minimize the need for returns. Jet.com offers customers a lower price if they opt out of free returns.

Ben Emmrich, strategic partner developer at Google Shopping Express and a presenter at the workshop, said 3D modeling in which shoppers can view items online and see how the products will look in their own space, such as how a piece of furniture will fit within the customer's specific floor plan, can minimize the need for returns.

The Role of Supply Chain in Humanitarian Efforts

Supply chain professionals can provide expertise and resources to help connect products and services with those in need, and 3PLs are using their expertise and advanced technology to support the movement of goods, particularly in markets that don't cater to traditional supply chain movements.

Humanitarian supply chain efforts are often filled with uncertainty as well as time and resource constraints. There is typically little warning of when disaster will occur, the extent of the damage and what resources will be needed. Third-party logistics providers are in a position to draw upon their technology and employees' expertise to facilitate a rapid response.

The American Logistics Aid Network helps connect relief organization with supply chain partners that can provide local warehouse space; transportation; material handling equipment; advice on how to best move products into position; or other goods and services. ALAN network members have responded to requests for forklifts and pallet jacks to help with tornado recovery; transported tool trailers to help communities rebuild in the wake of devastating floods; and donated office and warehouse space to help the American Red Cross prepare for hurricanes.

In late 2016, Hurricane Matthew, the worst major hurricane in 50 years hit Haiti. Deutsche Post DHL Group sent a Disaster Response Team to Port-au-Prince to provide pro bono logistics support at Toussaint L'ouverture International Airport. They coordinated incoming international aid and prepared it for transportation to areas affected by the hurricane. It was the second time the DRT Americas, based in Panama, started operating in Port-au-Prince within 48 hours after receiving the request for support.

The UPS Foundation has contributed $1 million in funding and in-kind resources, including logistics expertise, technical support and technology innovation to support the use of drone technology to help save lives in Rwanda, Africa. A central health facility warehouses blood and other emergency medical supplies that can be delivered by drone in as little as 30 minutes. Rwanda will be home to the world's first drone medical delivery network that responds to urgent needs for blood supplies to more than a dozen healthcare clinics throughout country.

Rwanda's rainy season can make some of the country's roads inaccessible to ground transportation, but drones aren't affected by inclement weather, road hazards or traffic delays. GPS coordinates inform the central health facility and the destination healthcare center of the drone's exact location throughout its trip. As the drone reaches its destination, it releases a parachuted package, which drifts to a waiting healthcare worker on the ground. Then the drone returns to recharge for its next flight.

Drones will be able to make 50 flights every day throughout Rwanda. The drone delivery network has the ability to reach about two-thirds of Rwanda's land mass and 50% of its population in a single day with the potential to expand to the rest of the country next year.

For more than 15 years, FedEx has supported the USO as its primary shipper, ensuring the delivery of thousands of care packages each year to service men, women and their families around the world. FedEx also donated money and shipping to the American Red Cross as the agency responded to disasters in the U.S.

Throughout 2017, earthquakes, tsunamis and hurricanes brought devastation to areas throughout the world. In the Asia-Pacific, heavy monsoon rains in August caused disastrous floods and landslides. In August and September, the U.S. faced severe flooding and wind damage from Hurricanes Harvey and Irma. Also in September, Mexico suffered an 8.2-magnitude earthquake, the largest in nearly a century. The earthquake led to a tsunami, increasing damage in the area.

After each of these events, the rapid delivery of relief supplies has helped aid in the recovery of the area and minimize further damage.

How can logistics providers aid in future disaster relief efforts? Will advanced 3PL technologies streamline the movement of goods to those in need? Could 3PLs apply lessons learned in disaster scenarios to their overall operations?

Greening of the Supply Chain

Sustainability within the supply chain has continued to improve, and green initiatives are affecting everything from surface transportation to warehouses.

As trucks become cleaner, the entire supply chain becomes greener. Within the U.S., the newest greenhouse gas initiatives related to Class 8 tractors took effect in 2017, which has led to better fuel economy. Another mandate will take effect in 2021. Many manufacturers have improved the aerodynamics of vehicles to help meet the requirements, and today's equipment incorporates lower idle RPM's and down speeding, which lowers the speed of the engine, also improving fuel economy.

OEMs have also focused on taking weight out of drivelines, axles and wheels by re-designing systems and using lighter metals. Less weight means the vehicle doesn't need as much power, which improves fuel economy. Weight savings also mean private fleets can load more in a trailer, which can increase payload but won't result in as much fuel savings.

Connected engines give fleets the ability to monitor driver behavior and coach drivers to reduce hard braking events or unnecessary idling, which burn fuel. The engines can also report back as fault codes arise, and timely maintenance can boost fuel economy.

In addition, clean diesel technology continues to improve, and the Diesel Technology Forum said clean diesel truck engines now make up 30% of the market. Over a five-year period, the newest-generation commercial vehicles have saved 4.2 billion gallons of diesel fuel and reduced 43 million metric tons of carbon dioxide, 21 million metric tons of nitrogen oxides and 1.2 million metric tons of particulate matter, said Allen Schaeffer, executive director of the Diesel Technology Forum.

The Diesel Technology Forum conducted its research based on data provided by the information and analytics firm IHS Markit, which examined information from about 3 million Class 3 to 8 vehicles in operation from model year 2011 through 2016 throughout the United States.

The Department of Energy's Annual Energy Outlook 2017 projects that fuel economy in new medium- and heavy-duty vehicles will increase 38% from 2016 to 2032 before leveling off. Due to fuel efficiency regulations, medium- and heavy-duty vehicle energy consumption will decline from 2023 to 2033, despite continued increase in miles traveled, and increases in freight travel demand will be offset by rising fuel economy standards. As a result, heavy-duty vehicle energy consumption will be approximately the same in 2040 as it was in 2016, the agency said.

Freight shippers, carriers, logistics companies and other stakeholders have continued to commit to reduce emissions through the U.S. Environmental Protection Agency's SmartWay program—a voluntary effort designed to help the freight transportation sector of the supply chain improve efficiency.

In mid-2017, the partnership had more than 3,500 partners. Program participants partner with the EPA to measure, benchmark and improve logistics operations so they can reduce their environmental footprint. Participants supply the EPA with information on vehicle class, engine model year, body type, total miles, revenue miles, empty miles, fuel usage by class, average payload, average capacity volume, percent capacity utilization by class, average idle hours per truck, and use of particulate matter control equipment by truck class and engine model year.

The EPA estimates the SmartWay program has saved 196.5 million barrels of oil and $20.6 billion in fuel costs, along with eliminating 94 million metric tons of air pollution.

The trucking industry is also investing in alternative vehicles, including those powered by natural gas, propane or electricity. The DOE reported that sales of battery electric, plug-in electric hybrid and fuel cell light-duty vehicles will continue to increase, reaching about 9% of the total projected sales for light-duty vehicles in 2025, or 1.5 million vehicles.

Electrification has been more prominent in warehouse equipment, such as forklifts, and smaller trucks, particularly in specialty, short-haul and drayage applications, but many of the lessons gained are being applied to Class 8 vehicles. Elon Musk, CEO of Tesla Inc., announced that the company had tentative plans to unveil its first battery-powered Class 8 tractor in late October 2017.

Because pure battery technology would be too heavy and too expensive to power long-haul Class 8 tractors, many manufacturers are taking a micro-hybrid approach and electrifying accessories, such as cooling fans, power steering, brakes, water fans and HVAC systems. They are also working to capture energy through regenerative braking and waste-heat recovery that would provide power for accessories. All of that would reduce the demand placed on the engine, which would improve fuel efficiency.

Nikola Motor Co. has announced its plans to launch the first hydrogen-electric Class 8 truck in mid-2020. Nikola One uses high-density lithium-ion batteries and a hydrogen fuel cell, and operating costs for the Nikola tractors will be more than 30% lower than a diesel-powered tractor, said Trevor Milton, founder of the company.

One area of harmonization across multiple countries is a test cycle known as the World Harmonized Transient Cycle, which is a transient engine dynamometer schedule defined by the global technical regulation developed by the UN ECE GRPE group. The regulation covers a world-wide harmonized heavy-duty certification procedure for engine exhaust emissions and is based on the world-wide pattern of real heavy commercial vehicle use.

engine exhaust emissions and is based on the world-wide pattern of real heavy commercial vehicle use.

As part of WHTC, two representative test cycles, a transient test cycle with both cold and hot start requirements and a hot start steady-state test cycle, have been created covering typical driving conditions in the European Union, United States, Japan and Australia. WHTC testing requirements were adopted for the first time by the Euro VI emission regulation for heavy-duty engines.

In Europe, the Euro VI standards for heavy-duty commercial trucks are comparable to the U.S. 2010 standards and introduced particle matter emission limits, stricter onboard diagnostic requirements and a number of new testing requirements. They took effect in 2013-2014, Schaeffer said.

Logistics providers are also working to increase efficiency in the final leg of deliveries. Route optimization and real-time visibility can help providers find the most efficient route, thereby removing unnecessary miles or idling due to congestion. Click-and-collect innovations could also cut down on the number of miles driven for deliveries.

DHL Express has increased the number of bicycles it uses to make deliveries. The logistics provider said it has already replaced up to 60% of inner-city vehicle routes in some European countries with cargo bicycles, and it expects that number to increase as it rolls out bicycle-powered deliveries in other areas. said John Pearson, CEO, DHL Express Europe.

"Bicycles offer a number of advantages in express delivery operations: they can bypass traffic congestion and make up to two times as many stops per hour than a delivery vehicle," said John Pearson, CEO of DHL Express Europe. "And crucially, they generate zero emissions, which reinforces our own ongoing program to minimize our environmental footprint and supports city governments' efforts to promote sustainable city living."

UPS rolled out its first electrically-assisted tricycle for delivering packages in the U.S. in Portland, Oregon, in late 2016. The company already uses traditional bicycles seasonally for deliveries in the city. The success of the eBike program was first demonstrated in 2012 in collaboration with the city of Hamburg, Germany, UPS said, adding that the Germany program will serve as a model for the Portland pilot project.

Within the warehouse, logistics providers and shippers are saving energy by investing in LED and motion-sensor lighting, utilizing technology to track and reduce power surges, and installing solar panels on buildings. UPS, for example, reported that by the end of 2017, it will have invested $18 million to provide a nearly five-fold increase in the amount of power generated from solar at UPS facilities. UPS first began investing in solar power in 2004, and the expanded solar portfolio is expected to reduce carbon emissions by approximately 8,200 metric tons per year.

How will supply chain sustainability initiatives change as technology advances? Will the greening of the supply chain change the execution of the final-mile? Will carriers increase their utilization of alternative-fueled vehicles?

ABOUT THE STUDY

About the Study

Dr. C. John Langley, clinical professor of supply chain and information systems and director of development at the Center for Supply Chain Research at Smeal College of Business at The Pennsylvania State University, initiated the Annual 3PL Study 22 years ago to document the significant transformation of the rapidly evolving global 3PL industry.

Since the study launched in 1996, the business environment has changed, shipping demands have increased, technological capabilities have grown, and the logistics sector has experienced considerable change. The supply chain has become a value driver and differentiator. Its evolution continues, and today changes are taking place at a rapid pace.

New technologies are creating opportunities that were once unthinkable. Today, 3PLs can provide continuous visibility and collect more data than ever before. That is driving overall network optimization and creating a more agile supply chain. Shippers and their logistics partners can see information in real time, make decisions earlier and alter shipments mid-route, if needed, to keep the supply chain moving.

For several years, we have seen e-commerce and business-to-consumer shipping explode.That growth continues, and parcel shipping is making up more of the supply chain. Last year we noted that when the study started 22 years ago, neither Google nor Amazon existed. Since last year's report, we've seen increased offerings of same-day or even one-hour shipping from Google Express and Amazon. Innovation continues, time compressions are ongoing, and expectations are increasing.

The rapid pace of change makes operations more complex for shippers and their logistics providers, and 3PLs are going to greater lengths to adopt new technologies, improve service offerings and develop supply chain strategies that can give them a competitive advantage.

Again this year, researchers continue to see 3PLs evolve from tactical service providers to collaborative partners that are taking on greater accountability and control. To meet increased shipper demands, 3PLs are creating a comprehensive suite of integrated logistics services to address the overall network and create a lean, cost-effective supply chain. In addition, many are providing add-on services that increase their value, such as replenishing shelves or making white-glove deliveries.

3PLs are utilizing proprietary and best-in- class technology coupled with talented supply chain professionals, to not only collect but also analyze data. Shippers are demanding actionable information, and 3PLs are responding with increased capabilities. Gainsharing and collaboration remain important to many relationships, and again this year both 3PL users and providers agree that collaborating with other companies, even competitors, to achieve logistics cost and service improvements holds value.

With each report, researchers have uncovered new or shifting challenges that supply chain executives have faced as they work to manage and adapt their operations to market conditions. Throughout the duration of the study, researchers have had evidence that solid relationships between 3PLs and customers have made both better equipped to address emerging issues, which change with time. In the past 22 years, issues have ranged from volatility in fuel costs to supply chain security demands to near shoring.

The 3PL sector and the business environment have become far more global than when the study launched in 1996. Logistics providers have responded by expanding services for customers with global logistics needs. Last year, the study reported continued collaborative and positive relationships between shippers and 3PLs. The factors that contribute to that success shift as the economy, technology and the operating environment change.

Since the Annual *Third-Party Logistics Study* launched, it has served as a vital tool for shippers and 3PLs, and it has become a widely anticipated, heavily referenced index on the state of the 3PL industry.

Throughout the year, the study team establishes topics of interest, develops the survey tool, conducts the research, analyzes the results, writes this report, and presents and shares the findings. Numerous industry representatives, supporting organizations and sponsor firms have contributed to the study, helping to maintain the steady cadence needed to sustain the report throughout the past 22 years. Both shippers and 3PLs have generously participated in the surveys and interviews needed to produce the Annual 3PL Study, and the *22nd Annual Third-Party Logistics Study* is dedicated to those who have made this possible. We are immensely appreciative of their great contribution to the overall effort.

The study has evolved in both reach and scope as has the participation rate among members and affiliates of the Annual Third-Party Logistics Study's partner organizations. As part of this year's survey process, the study attracted 580 respondents, a 65% increase over the number of participants taking part last year.

Results included in the "Current State of the 3PL Market" chapter from current users of 3PL and 4PL services rely primarily on data gathered from respondents in North America (68%), Asia (9%) and Europe (17%). Readers are asked to be cautious about comparing the data in this report to data from *Annual Third-Party Logistics Study* reports produced prior to 2014, because this year's base of respondents is more geographically focused.

The Annual 3PL Study Process

Steps and elements of the development of the *Annual 3PL Study* include:

Accessibility: Links to the Web-based survey tool are circulated through *Annual 3PL Study* supporting organizations for distribution to their members and affiliates. This year's survey circulated in the spring of 2017, yielding 580 usable responses, from both users and non-users of 3PL services, and providers of 3PL services. The study report and additional materials are also presented via its dedicated website, www.3PLstudy.com.

Topics: In addition to measuring core trends in the 3PL industry, the *Annual 3PL Study* conducts in-depth examinations of contemporary supply chain topics that affect both users and providers of 3PL services. This year's topics include: blockchain for supply chain, automation/digitization in transportation, risk/resilience in shipper-3PL relationships and technology versus talent assets.

Contributing Sponsors: The *22nd Annual Third-Party Logistics Study* is jointly owned by C. John Langley Jr., Ph.D., and Infosys. The sponsors of the study are Penske Logistics, Korn Ferry International and Penn State University.

Multiple Research Streams: A distinguishing feature of the Annual 3PL Study is the incorporation of multiple streams of research that the study team undertakes to validate and illuminate the findings in this report. The team solicits survey topic ideas throughout the year from key industry participants and through desk research conducted by the team and Infosys, which also helps to vet potential topics of interest. Survey topics and questions attempt to reflect key issues and trends facing both users and providers of logistics services. This year, the team led an in-person workshop with shippers and logistics providers at Google's headquarters in Mountain View, California. Researchers also connected with shippers electronically for intensive exploratory interviews following the survey to discover deeper implications.

Wide Coverage: *The Annual Third-Party Logistics Study* is presented and discussed in prominent supply chain industry venues, including the following:

- Presentations at influential industry conferences, such as the Council of Supply Chain Management Professionals (CSCMP), as well as annual events conducted by The Logistics Institute – Asia Pacific at the National University of Singapore; the Gordon Institute of Business Science (GIBS); the business school of the University of Pretoria in Johannesburg, South Africa; and executive education programs available through the Center for Supply Chain Research at The Pennsylvania State University and Penn State Executive Programs and NASSTRAC (National Shippers Strategic Transportation Council).
- Analyst briefings, typically conducted annually in the weeks following the release of the annual study results in the fall.
- Magazine and journal articles in publications, such as *The Wall Street Journal*, *Supply Chain Management Review*, *Logistics Management, Inbound Logistics, Logistics Quarterly, Supply Chain Quarterly* and *Supply Chain Digest.*
- Webcasts conducted with media and publications, including *Supply Chain Management Review, Logistics Management, SupplyChainBrain*, Stifel Nicolaus and others.

Supporting Organizations: Each year a number of supply chain organizations facilitate the research process by asking members and other contacts to respond to the survey. In addition to completing the survey, individual companies help out by enabling executives to participate in facilitated workshops and by lending subject matter expertise. Please see page 3 for a listing of these valued contributors.

Definitions: Survey recipients were asked to think of a "third-party logistics (3PL) provider" as a company that provides one or more logistics services for its clients and customers. A "fourth-party logistics (4PL) provider" is one that may manage multiple logistics providers or orchestrate broader aspects of a customer's supply chain. To ensure confidentiality and objectivity, 3PL users were not asked to name the specific 3PLs they use.

2018 Third-Party Logistics Goals and Report Structure

Research and analysis for the Current State of the Market chapter sets out to:

- Understand what shippers outsource and what 3PLs offer.
- Identify trends in shipper expenditures for 3PL services, and to recognize key shipper and 3PL perspectives on the use and provision of logistics services.
- Determine how 3PLs add value to their customers' supply chains.
- Update researchers' knowledge of 3PL-shipper relationships, and to learn how both types of organizations are using these relationships to improve and enhance their businesses and supply chains.
- Understand the benefits reported by shippers that are attributed to the use of 3PLs.
- Assess the importance of 3PL capabilities relating to people, process, technology, and execution/implementation.
- Document what types of information technologies and systems are needed for 3PLs to successfully serve customers, and to assess the extent to which this success is being achieved.
- Examine why customers outsource or elect not to outsource to 3PLs.

The Special Topics sections are crafted to take an introspective view of the future of the 3PL industry and shipper-3PL relationships. Topics are chosen based on what was learned from the study process and current trends in the industry. Goals for the sections include:

- **Blockchain for Supply Chain:** The growing demand for visibility in the supply chain is leading to new technologies and innovation. As a result, interest in blockchain technology, which breaks each movement down into a block and documents every time a shipment changes hands, is increasing. The study sought to understand how blockchain could provide value, improve security and meet regulatory requirements. Researchers also gauged the level of current and future interest in blockchain technology.
- **Automation/Digitization in Transportation:** Rapidly changing technology is providing more opportunities for automation and digitization within the supply chain. It is changing the ways shippers and 3PLs collect and analyze data and also facilitate technological advances on equipment used to transport goods, such as Class 8 trucks. Both of these applications are increasing the ability of those within the supply chain to make data-driven decisions and increase efficiency. This year's study looked at how shippers and 3PLs are using data and how changes to equipment could improve safety.
- **Risk/Resilience in Shipper-3PL Relationships:** Increased visibility and greater access to data are enhancing the ability of those within the supply chain to take action early to reduce risks by lessening or mitigating the consequences of supply chain disruptions. The *2018 3PL Study* looked inside shipper-3PL relationships to see how prepared they are to deal with uncertainties that may arise, and how they can respond to problems before they actually occur.
- **Logistics Talent Revolution:** Because technology is changing the way supply chains operate, researchers wanted to look at how it is reframing the demands on the workforce, particularly as automation, digitization and data collection capabilities are growing rapidly. Current supply chain leaders and are taking on even greater importance as companies work to build more efficient and technologically advanced supply chains, and the study looked at how their roles will continue to gain importance going forward.

To create the Contemporary Issues section, the study team considers information gathered during the study process and identifies issues that may affect shipper-3PL relationships going forward. This year the report evaluated the role of logistics in China, managing supply chain costs, the role of the supply chain in humanitarian efforts, and the greening of the supply chain.

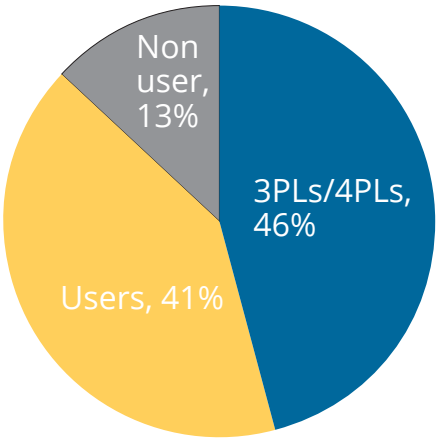
About the Respondents

Shippers: **Figure 18** reveals the percentage of shipper respondents to the survey, including both users and non-users of 3PL services and the percentage of 3PLs. The non-user responses are useful because they provide valuable perspectives on why they do not currently use 3PLs at this time, as well as on a number of other relevant topics. Shipper respondents are typically managers, directors, vice presidents and C-suite executives.

3PLs: 3PL executives and managers responded to a similar, but separate version of the survey. 3PL respondents represent: 1) several operating geographies; 2) an extensive list of industries served (actually quite similar to the shipper-respondent industries); and 3) a range of titles, from managers to presidents/CEOs. Approximately 30% of the 3PL firms expected 2016 company revenues in excess of U.S. $1 billion (approximately €950 million), while about 56% reported revenues of less than U.S. $500 million (approximately €475 million). Of that top 30%, only 4% expected revenues above U.S. $25 billion (approximately €23.5 billion). About 14% reported revenues of between U.S. $500 million and $1 billion (approximately €475 million to €950 million).

Figure 19 reflects the nine most prominent industries reported by users of 3PL services, accounting for almost 93% of the overall respondents. **Figure 20** includes all shipper respondents' anticipated total sales for 2017.

FIGURE 18: ABOUT THE RESPONDENTS



User: Shipper/customer currently using 3PL/4PL

Non-User: Shipper not currently using 3PL/4PL services

3PL/4PL: Provider/manager of outsourced logistics services

Percentages above reflect the relative response rates for the respondent types indicated

FIGURE 19: RESPONDENTS' MAJOR INDUSTRIES

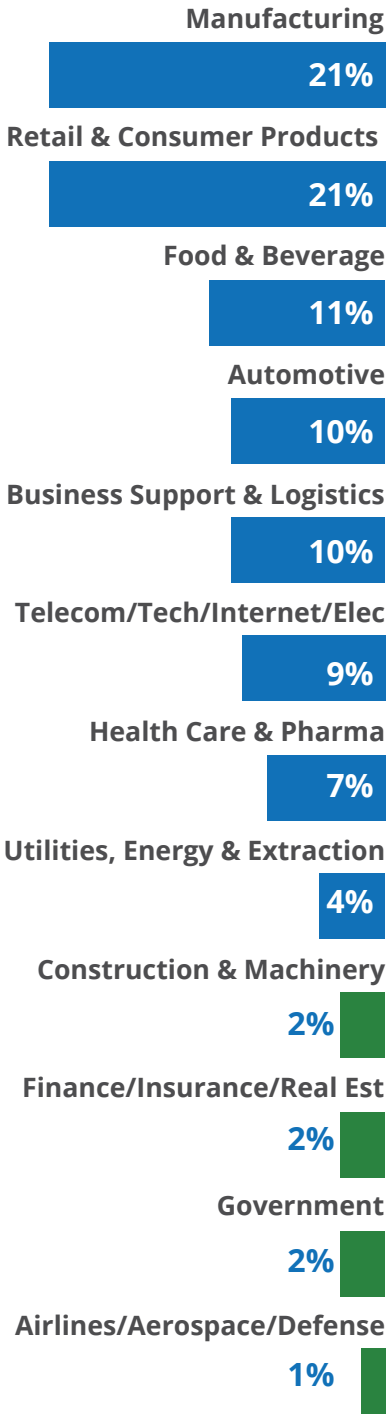
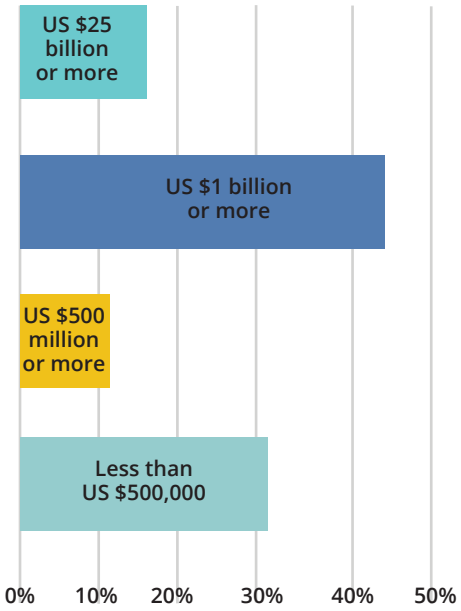


FIGURE 20: RESPONDENTS' ANTICIPATED SALES



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PennState Smeal College of Business

Penn State is designated as the sole land grant institution of the Commonwealth of Pennsylvania. The University's main campus is located in University Park, Pennsylvania. Penn State's Smeal College of Business is one of the largest business schools in the United States and is home to the Supply Chain & Information Systems (SC&IS) academic department, Center for Supply Chain Research (CSCR™), and Penn State Executive Programs. With more than 30 faculty members and over 800 students, SC&IS is one of the largest and most respected academic concentrations of supply chain education and research in the world. SC&IS offers supply chain programs for every educational level, including undergraduate, graduate and doctorate degrees, in addition to a very popular online, 30-credit professional master's degree program in supply chain management. The supply chain educational portfolio also includes open enrollment, custom and certificate programs developed by Smeal's Penn State Executive Programs and CSCR™, which helps to integrate Smeal into the broader business community. Along with executive education, CSCR™ focuses its efforts in research, benchmarking and corporate sponsorship. CSCR™ corporate sponsors direct the Center's research initiatives by identifying relevant supply chain issues that their organizations are experiencing in today's business environment. This process also helps to encourage Penn State researchers to advance the state of scholarship in the supply chain management field. Penn State's Smeal College of Business has the No. 1 undergraduate and graduate programs in supply chain management, according to the most current report from Gartner. For more information, please visit www.smeal.psu.edu/scis and www.smeal.psu.edu/cscr

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2018 22nd Annual Third-Party Logistics Study: The State of Logistics Outsourcing, C. John Langley Jr., Ph.D., and Infosys, 2018.

2018 THIRD-PARTY LOGISTICS STUDY

The State of Logistics Outsourcing

Results and Findings of the 22nd Annual Study

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