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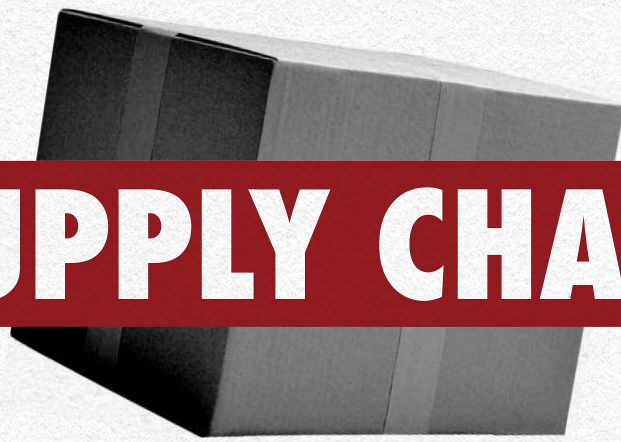
WHITE PAPER

THE NEW



SUPPLY CHAIN

IMPERATIVE

INTRODUCTION

Retail supply chains are undergoing a generational transformation as the rise and competitive nature of e-commerce are changing customer expectations and how retail supply chains must operate in order to meet those expectations.

It is not just e-commerce driving transformative change, though. Five major themes are rippling through retail supply chains in the U.S. that will affect all shippers over the years to come.

Retailers that are dynamic, forward-thinking and willing to make the necessary and sometimes painful investments in order to succeed in this new world can still thrive despite competitive intrusion from Amazon and a host of other disruptors looking to take market share from traditional brick-and-mortar retailers. Retailers that do not invest in their supply chains and the technology necessary to compete will be left behind.

The rising penetration of e-commerce requires increasingly automated, visible and connected supply chains that can get products to consumers faster, cheaper and more efficiently.

To better understand the greatest challenges facing retail shippers and how they are addressing them, FreightWaves partnered with Redwood Logistics to survey a diverse set of shippers and get their take on the most important issues facing retail supply chains, as well as what they are doing to improve their transportation networks.

One caveat is that we conducted our survey when the coronavirus (COVID19) was mostly a phenomenon contained to China (and other parts of Asia) and before it had become a global pandemic, causing lock-downs in most of the world. We have updated our outlook and made inferences about how retailers would have responded differently to our survey questions where appropriate.

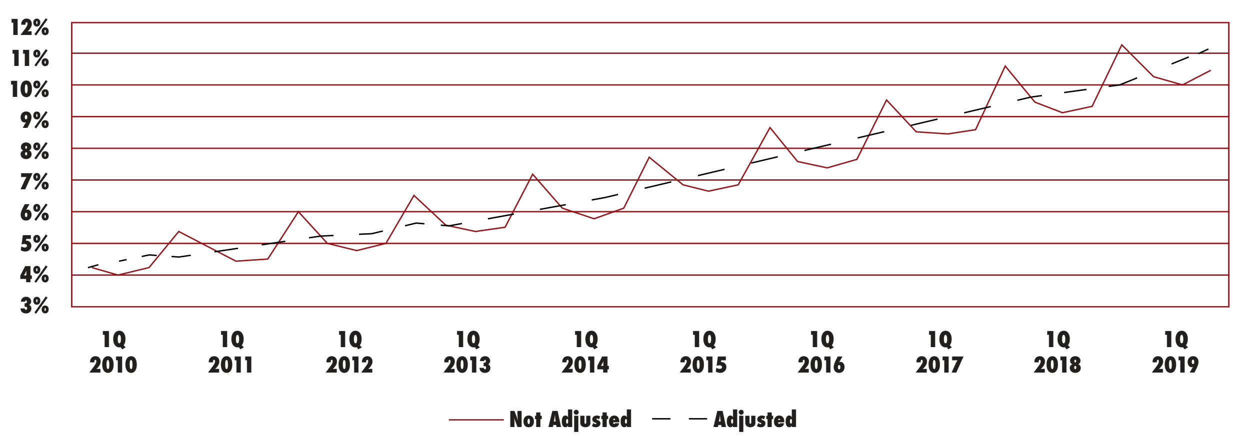
AMAZON, E-COMMERCE AND THE ONE-DAY DELIVERY EFFECT

The effect of Amazon (and e-commerce in general) on transportation and supply chains is undeniable. Amazon currently accounts for just 3% of total U.S. retail spending and nearly 50% of total e-commerce sales. Total e-commerce revenue in the U.S. should eclipse a half-trillion dollars in 2019.

The biggest retailer in the U.S., Walmart, is growing its online sales even faster than Amazon and now accounts for about

>> U.S. e-commerce sales: penetration of overall retail sales (2010-2019)

Estimated quarterly U.S. retail e-commerce sales as a percent of total quarterly retail sales: 1st quarter 2010 - 3rd quarter 2019



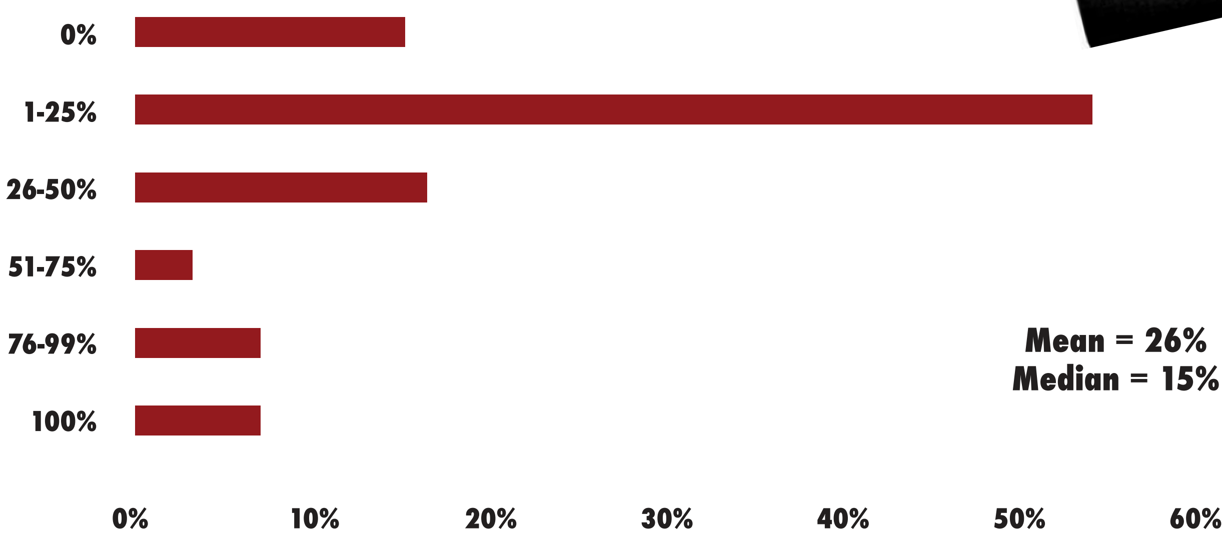
Source: U.S. Census Bureau

5% of total U.S. e-commerce spending, just behind eBay, which has approximately 7% of the total market share.

According to the U.S. Census Bureau, the latest figures available show total U.S. e-commerce sales of $154.5 billion in the third quarter of 2019, an increase of 16.9% on a year-over-year basis compared to the third quarter of 2018.

Surprisingly, this still only represents a penetration rate of 11.2% of the U.S.'s total retail spending of $1.381 trillion in the third quarter, meaning the shift to online and e-commerce is still in the very early stages in the U.S. Even so, the penetration of online retail has roughly tripled over the past 10 years from under 4% in 2009.

>> What percentage of your sales are e-commerce or mail-order as opposed to physical stores?



E-commerce sales in the U.S. will likely continue to climb at a double-digit rate for many years to come, and penetration in the U.S. could easily triple and still be nowhere near reaching the highest penetration rates across all categories in e-commerce (about 60%).

Our survey revealed that an average of 26% of retail sales were derived online, about 2.5 times higher than the national penetration rate.

The effects of rapid and continued penetration of e-commerce in the U.S. on trucking and supply chains are numerous and include more distribution centers (DCs) and warehouses, more less-than-truckload (LTL) volumes and lanes, more hub-and-spoke networks, more imports from China, more final-mile infrastructure, more drayage and the increasing shift of transportation assets in-house by Amazon and other leading retailers that are increasingly dominating the retail landscape.

Reflective of these trends, while warehouses in units are only up 25% in the past 10 years, warehouse square footage is up far more, and warehouse employment has doubled to 1.2 million individuals.

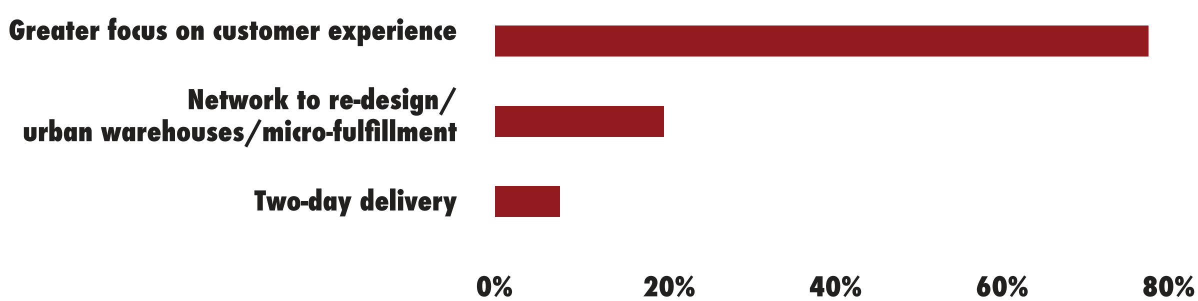
Another effect of increasing e-commerce penetration is more shipments but in smaller quantities, which can increase the cost per unit to move freight. This phenomenon is likely to result in growth for LTL. Alternatively, consolidation services can reduce shipping inflation by combining similar freight heading to similar destinations. In such a scenario, the number of trucks is reduced into a single truckload shipment (as compared to shipping LTL), which reduces congestion, lowers cost and reduces errors.

On the shipper side, retailers have to invest a great deal of capital upfront and must sacrifice profits to assemble an efficient network and supply chain in today's digital age. The widespread proliferation of one-day delivery being offered seven days per week requires a tremendous amount of investment. For example, Amazon spent several billion dollars in 2019 to meet this objective for its Prime one-day shipping. To achieve full one-day shipping in markets with more than 100,000 people, Amazon will reportedly need 350 to 400 delivery stations compared to just 115 as of a few months ago.

As Amazon garners ever-increasing share of both overall and e-commerce retail in the U.S., its transportation needs are immense. Amazon's transportation assets now run the gamut—it has its own planes, Class 8 trucks, brokerage operations and final-mile delivery network. Founder Jeff Bezos has indicated that he wants to control 10% of the $8.5 trillion logistics market by 2025. To do so, Amazon is increasingly relying on its own transportation and delivery network to transport many of its packages, and while still relying heavily on UPS, it has cut ties with FedEx.

Amazon's foray into ever-shorter delivery times has severely pressured its delivery partners' margins and capital expenditures (in addition to its own). For example, UPS' earnings before interest and tax (EBIT) have been nearly cut in half in the 15 years since Amazon Prime launched in 2005. UPS is now left in a delicate balancing act of limited pricing power and heavy investment as Amazon accounts for more than 10% of its revenue and around a quarter of its overall traffic.

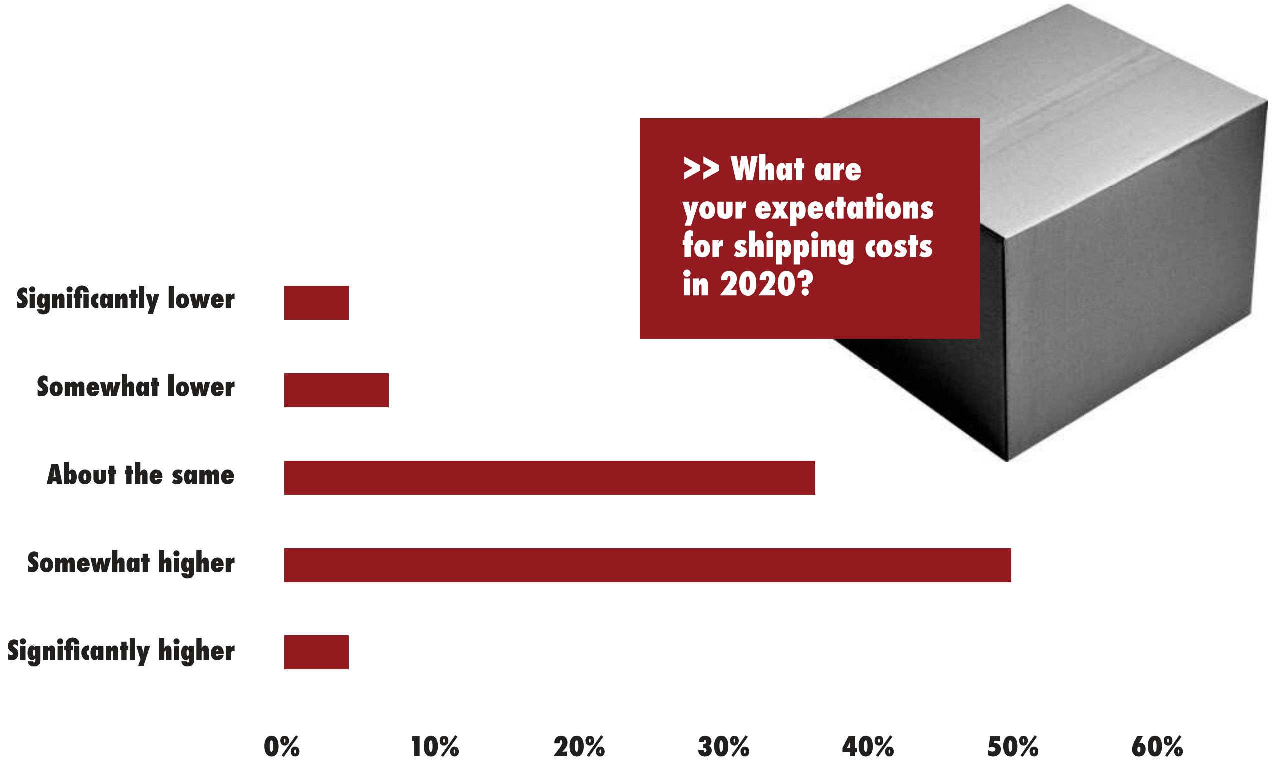
>> What strategies are you implementing to combat the "Amazon Effect?"



Our survey respondents (competing retailers with Amazon) overwhelmingly cited greater focus on customer experience as the number one strategy they are implementing to combat the Amazon effect. Network redesign, urban warehouses and micro-fulfillment were a distant second.

As of now, the rest of the retail industry is mostly still playing catch up to Amazon. Walmart and Target have made significant strides in e-commerce, but it is an open question as to whether their recent aggressive push may be too late. One strategy that many brick-and-mortar retailers are using to ramp up e-commerce and compete is using excess back-of-house space in physical retail locations to aid in fulfillment.

Shopify has emerged as an independent Switzerland of sorts to the e-commerce industry by offering its own third-party fulfillment and delivery network that helps level



the playing field for small and medium-size enterprises (SMEs) by way of scale and competitive infrastructure to Amazon.

Finally, one consequence of Amazon's aggressive push into one-day delivery is that U.S. consumers have come to expect free shipping (and even free returns) as customary from all retailers, putting massive pressure on retailers' margins and capital expenditures as they scramble to keep up.

One interesting finding from our survey was that, on top of increasing cost from investments in the supply chain by retailers to increase speed and efficiencies and pressure from having to match Amazon's delivery and return policies, the majority of shippers in our survey are expecting moderate to significant shipping cost inflation in 2020. After epidemics and trade wars, shipping cost inflation is the third biggest worry for shippers in 2020. This will be an additional headwind for retailers to monitor, especially if the cost of shipping outpaces revenue growth, which could cramp margins. We view the shipping cost headwind as a multi-year issue, so retailers will need to carefully manage and optimize around this development.

THE BIG ARE GETTING BIGGER

Retailers closed more than 9,000 physical stores in 2019. This is often referred to as the "retail apocalypse." The U.S. is dramatically over-stored, especially compared to other countries globally. The U.S. had 23 square feet of store space per person as of 2018, by far the most in the world, according to the International Council of Shopping Centers. This compares to just five in the U.K., four in Spain and two in Germany. This means that as retail sales increasingly transition online, more and more physical retailers will fail, and vacant retail real estate will need to be repurposed.

However, Amazon isn't the only e-commerce retailer that has been taking down physical retailers. One little-known fact is that Walmart, Costco and Target together have done more damage in terms of market share gains as Americans increasingly go to big-box stores to meet most of their consumption needs. Together, the top six U.S. retailers account for 17.5% of overall U.S. retail sales. This figure is up significantly from just five or 10 years ago. Walmart's U.S. sales in fiscal year 2019 amounted to $391 billion, a staggering 7.2% of total U.S. retail spending of $5.46 trillion in 2019.

>> Top 6 retailers in the U.S.

Total U.S. retail sales (Percentage of total 2019 U.S. retail sales in billions)	$5,460	
Walmart	$391	7.2%
Amazon	$171	3.1%
Costco	$130	2.4%
Home Depot	$111	2.0%
Target	$80	1.5%
Lowe's	$72	1.3%
*Source: Company filings, FreightWaves Freight Intel calculations		17.5%

In terms of the impact on supply chains, we think this increasing consolidation of market share at top retailers further tips the leverage in transportation negotiations in favor of shippers compared to heavily fragmented truckload carriers. Other primary impacts include more volumes shifting to dedicated trucking, more intermodal volumes, and more freight sourcing and goods flowing in from China (and Southeast Asia post-trade war). Ultimately, shifting trucking volumes to dedicated from for-hire could result in disintermediation for 3PLs and brokers, but this has not been observed to date.

In recent earnings reports for publicly traded, asset-based carriers, dedicated divisions have been growing on a year-over-year basis and, in general, have dramatically outperformed their for-hire, over-the road (OTR) counterparts. This is partly due to the fourth quarter representing a trough in terms of the trucking market and year-over-year declines. We expect the competition in the dedicated sector to increasingly heat up as more inexperienced carriers enter the market and put added pressure on rates.

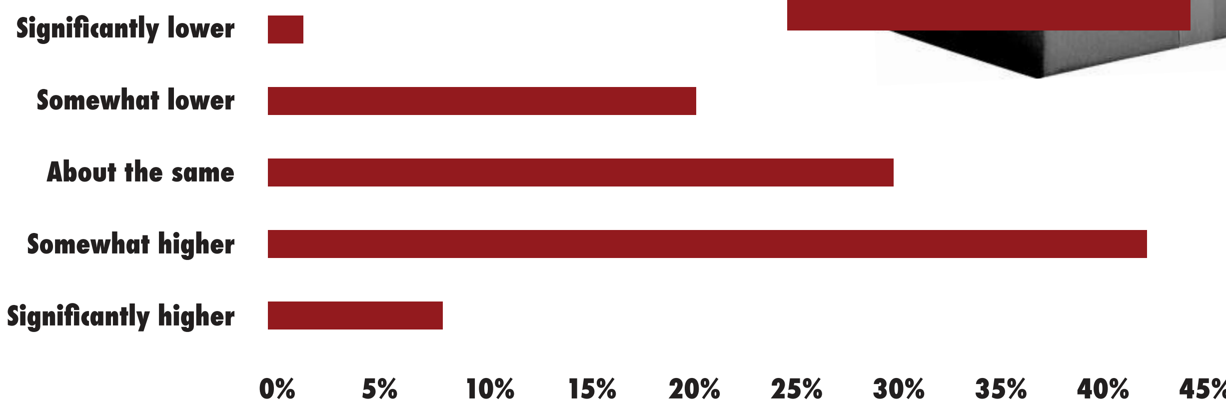
THE AMERICAN CONSUMER IS SUPPORTING THE U.S. ECONOMY

The U.S. consumer has been strong for the past 10 years and has arguably kept the country out of a recession during the past year. U.S. consumer spending accounts for two-thirds of the overall economy, and according to the National Retail Federation (NRF), a leading industry group, retail sales in the U.S. are forecast to increase between 3.5% and 4.1% in 2020. We believe this forecast is now outdated and our view is consumer spending will contract sharply from March through at least the early summer timeframe and then rise sharply in the latter half of 2020, resulting in a flat to negative year overall.

Of the five major themes influencing retail supply chains, this is the one that is now most subject to change as the coronavirus (COVID19) becomes a global pandemic and large swaths of the developed world are on lock-down, resulting in incredible economic damage as consumers can no longer go out and spend money in public places.

About 50% of our survey respondents are expecting somewhat higher (40%+) or significantly higher (5–10%) sales growth in 2020, which is consistent with last year's approximate 4% growth. This suggests that respondents expect more of the same in terms of continuing strength for the American consumer this year. Had we conducted this survey just a couple weeks later (after COVID19 had become a global pandemic), we believe that the results would have been nearly flipped, with most respondents choosing "somewhat lower" and "significantly lower."

>> What are your expectations for sales growth in 2020 as compared to 2019?



Retail spending has been strong given that the U.S. economy has enjoyed robust consumer confidence, solid job creation (with unemployment hovering at a 50-year low) and rising wage gains that have outpaced inflation. Prior to COVID19 becoming a global pandemic, the backdrop was looking solid with consumer balance sheets in fairly good shape, consumer credit metrics not too stretched, and steady appreciation in national home prices (most Americans' primary asset).

Had that backdrop persisted, we believe the consumer could continue to exhibit momentum and strength for some time to come. As things stand now, our base case expectation would be for a sharp drop in consumer spending (especially on discretionary items and big ticket purchases) in March and the second quarter of 2020, followed by a sharp rebound and a return to relative normalcy in the third and fourth quarters should the pandemic's progression follow the path of most epidemiologists' current line of thinking.

The strong consumer contrasts with the weak and recessionary industrial and manufacturing economy, which is reflected in the Institute of Supply Management's (ISM) Purchasing Managers' Index (PMI). The ISM's PMI fell in nearly a straight line from a peak above 60 in the summer of 2018 to a low of approximately 47 in December 2019 (see chart on page 8). Readings below 50 signify economic contraction. The ISM PMI registered six straight readings below 50 prior to a surprise jump to 50.9 in January (back into expansion territory). However, with the spread of the coronavirus and the negative impact on global trade and supply chains, we expect any near- to medium-term expansion in the ISM PMI to be short-lived. For the full year of 2019, Bank of America Merrill Lynch forecast that industrial production would grow just 0.8% in 2019 on a seasonally adjusted annual rate (SAAR) basis, down from 3.9% in 2018. The latest readings of industrial production are declining at -0.8% year-over-year.

The implications of a strong consumer on transportation and supply chains are numerous. We think some obvious examples are that dry van and reefer will outperform flatbed, open-deck and specialized trucking; this is exactly what we have seen over the past year. Even with COVID19 turning into a global pandemic, we believe dry van and reefer (given the dramatic increases in demand for consumer staples and consumables) will easily outperform flatbed which is exposed to much greater downside via the 50% drop

>> ISM PMI — Five-year chart

SONAR: ISM.PMI

in oil prices and the negative knock-on effects to housing and construction demand as the employment outlook clouds.

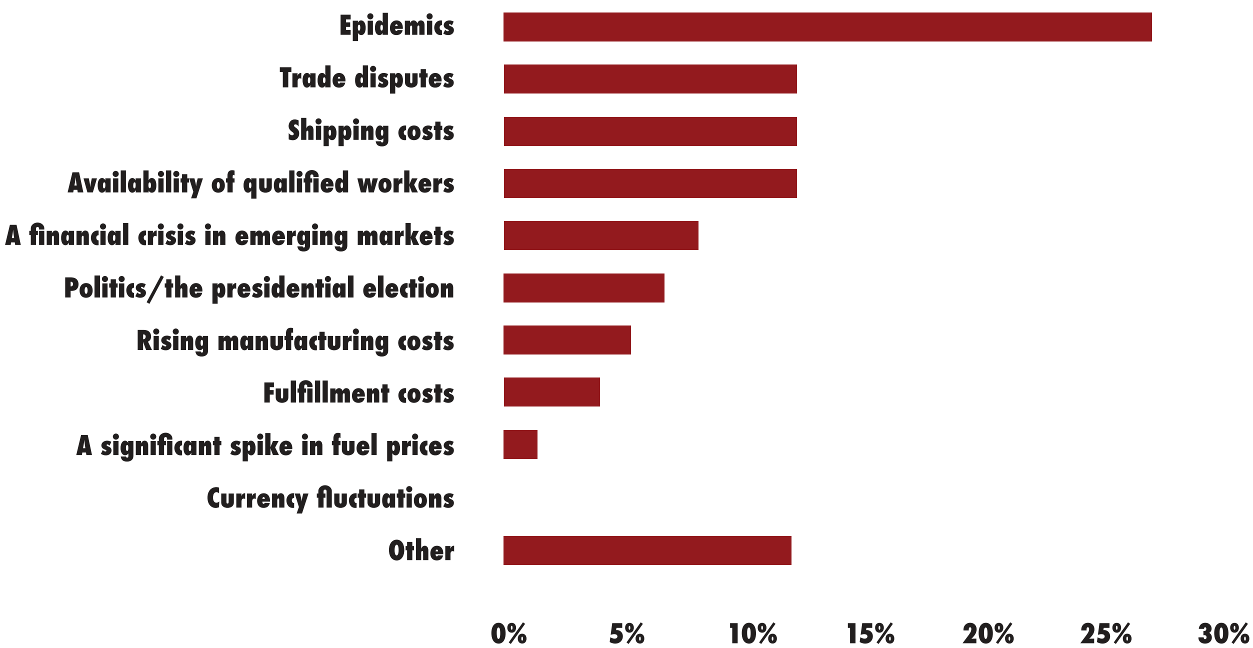
Retail is extremely seasonal, with the holiday season and calendar fourth quarter being by far the most important, accounting for a disproportionate amount of sales and profits. Because there is a lead time involved between products hitting the ports and being trucked or railed across the country to DCs and warehouses before ultimately hitting the store shelves, spot rates for dry van truckload tend to spike each year in the fall months leading up to December. We predict that the weakness in the industrial and manufacturing economy will make the fourth quarter in 2020 even more important for transportation markets, and the consumer will need to continue spending to allow for the late-2020 recovery in trucking markets that most executives are forecasting.

As we noted, one caveat that we would note with respect to respondents expecting another strong year for consumer spending is that the coronavirus has turned into a global pandemic; we believe this would have caused them to turn distinctly more negative in their outlook. COVID19 has likely already caused a recession in China and has the potential to cause a global recession as it spreads rapidly in the U.S. and likely causes a short and sharp recession. It is difficult to break the American consumer, in our view, but should the majority of Americans continue to be quarantined in future weeks or months, a recession is not only likely, but perhaps already underway.

On the bright side, after two to three months of COVID19 rapidly spreading in China, it now appears to be mostly under control, and economic activity (including consumer spending) appears to be getting back on track. Should the U.S. quarantine prove not too late and similarly effective, we believe the consumer could bounce back in a strong way and regain its prior strength. The latter snapback in consumer spending will likely require significant fiscal stimulus to prevent those employees in the travel, leisure, hospitality and restaurant industries from being laid off en masse and avoid a dramatic spike in unemployment.

Prior to COVID19 becoming a global pandemic (it was mostly contained to China and other parts of Asia at the time of our survey), our survey respondents were already keenly aware of this risk, with nearly 30% of responses citing epidemics as the number one significant risk to their supply chains in 2020. Again, had this question been asked today, we believe epidemics would have been the number one answer by an even greater percentage.

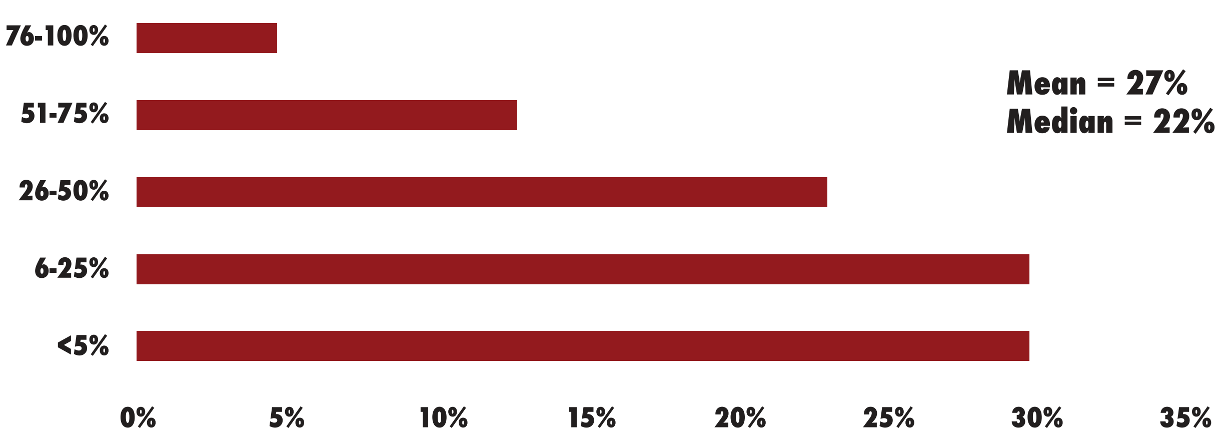
>> What are the most significant risks for your supply chain in 2020?



TRADE WAR IMPACTS AND INCREASING SUPPLY CHAIN MOVEMENT OUT OF CHINA

Through the first three quarters of 2019, U.S. imports from China fell approximately 13.5% year-over-year, according to the Census Bureau. Given China is the U.S.'s largest trading partner by far, this amounted to a decline of over $50 billion. The trade war and associated tariffs are a major issue for retailers in our survey as the average respondent sources 27% of their retail products from China. Therefore, diversifying their supply chains to alternative countries as a sourcing partner is a big issue. Also, trade

>> What percentage of your retail products are sourced from China?

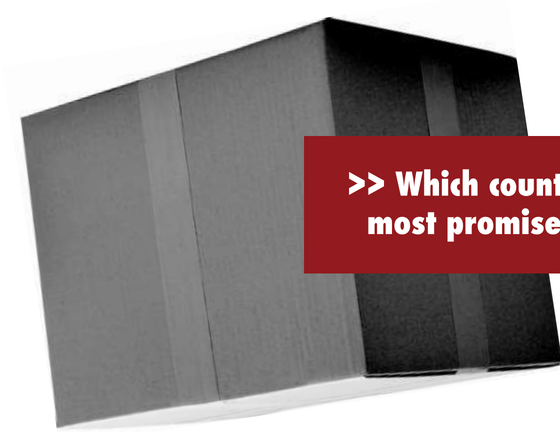


disputes were cited as the second greatest risk to retailers' supply chains in 2020, according to our survey.

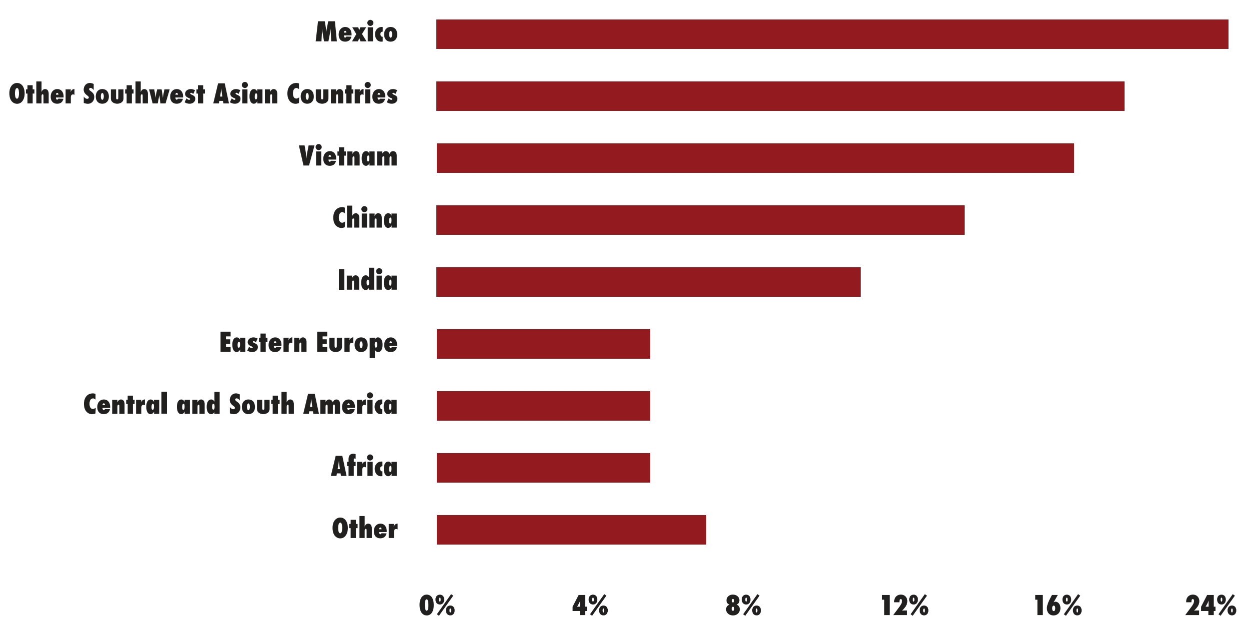
Mexico, the U.S.'s second-largest trading partner, was the primary beneficiary of that, with U.S. imports from Mexico climbing by about $15 billion through the first three quarters of 2019. This equates to an increase of 5.5% and demonstrates stronger trading relationships between the U.S. and its bordering neighbors, Mexico and Canada, during the trade war.

Vietnam has been the biggest beneficiary of the fractured U.S.-China relationship in percentage terms, with U.S. imports from Vietnam climbing by 35% year-over-year through the first nine months of 2019. The fastest-growing categories of U.S. imports from Vietnam include computers, telephone equipment and other machinery, traditionally stalwart Chinese exports.

In terms of where our survey respondents see the most promise for alternate sourcing outside of China, Mexico, other Southeast Asian countries, Vietnam and India topped the list. Interestingly, almost 15% of our respondents still cite China (the fourth highest on the list) as having the most promise for manufacturing and production, suggesting that retailers are not giving up on China as a manufacturing partner despite the implementation of tariffs.



>> Which countries/regions do you think have the most promise for manufacturing and production?



One thing to keep in mind regarding the shifting of supply chains away from China is that this will be a very long-term process that will take years as it took the U.S. and China significant time and investments to build out a highly sophisticated manufacturing and transportation infrastructure.

Vietnam, for example, lacks the skilled labor of China (in terms of proportion and absolute numbers) and has much poorer transportation infrastructure (roads, rails, ports, etc.) in comparison. Vietnam is also just a fraction of the size in terms of a trading partner with the U.S. In 2018, total trade between the U.S. and Vietnam was just $63 billion, with imports of $51 billion, according to the Office of the United States Trade Representative (USTR). This compares to total U.S. trade with China in 2018 of $737 billion, with imports of $558 billion, according to the USTR. This means that China is about 11 times the size of Vietnam as a trading partner with the U.S.; thus, it will take many years before a country like Vietnam can fill the void left by falling imports from China.

The effects of the trade war on transportation, logistics and supply chains have been stark. For example, before the trade war between the U.S. and China began, we typically saw retail shipping volumes (SONAR: CSTM.RETL) rise sharply and peak between August and September, and maritime shipping rates from China to the U.S. West Coast (SONAR: FBXD.CNAW) rose sharply and peaked at the same time. In 2019, this seasonality was far less pronounced.

>> Retail shipping volumes vs. maritime shipping rates (China to U.S. West Coast)

SONAR: CSTM.RETL, FBXD.CNAW

In normal seasonality, many shippers import goods from overseas in the third quarter—mainly from China. From there, the goods move into warehouses and distribution centers before ultimately hitting the storefronts by Black Friday in late November. As a result, the trucking market usually sees a rise in the average length of haul over this timeframe as shippers move freight out of West Coast warehouses to distribution centers closer to the end consumer.

However, we can clearly see the effects of the trade war as 2019 saw a collapse in U.S. retail imports compared to 2018. For example, in 2018 as the trade war began to heat up in front of the tariff increases on U.S. imports from China, we saw a huge pull-forward of demand to avoid the upcoming tariffs. The chart below illustrates this enormous pull-forward in demand as 2018 U.S. Customs Maritime import shipments (the green line) outpaced 2019 levels (the white line) by about 2.7 times.

>> Retail shipping volumes (2018 - green; 2019 - white)

SONAR: CSTM.RETL

Therefore, in 2018, because trade disputes incited shippers to import goods ahead of demand, this led to full warehouses and a lot of regional shipping around the port markets, which has translated into a much softer peak import season in 2019.

With overall U.S. retail sales forecast to have climbed about 4% in 2019, as we noted, we can conclude that the slower retail imports in 2019 are not a sign of decreasing demand but a correction from the 2018 overheating and pull-forward. This dynamic played out in the trucking markets in terms of high spot and contract rates and a lack of excess capacity in 2018. As 2019 cycled this tough comparison, rates collapsed as excess capacity emerged due to over-ordering of new trucks by carriers anticipating a continuation of robust 2018 conditions.

In terms of the impacts on transportation and supply chains from the trade war, we would expect an increasing displacement of freight flows away from the U.S. West Coast (e.g., LA/Long Beach ports), toward the U.S. East Coast and upward from Mexico (both by rail and truck). This, in turn, should result in less rail and intermodal freight flow from the West Coast eastward, where most of the goods are consumed (in and around population centers on the U.S. East Coast).

As a result, this may lead to more short-haul trucking as eastward intermodal volumes are replaced with regional trucking hauls. A mixed shift of freight imports to the U.S. East Coast makes transloading onto intermodal less efficient because intermodal has high upfront costs in transloading, whereas rail cost and drayage are cheaper in the middle.

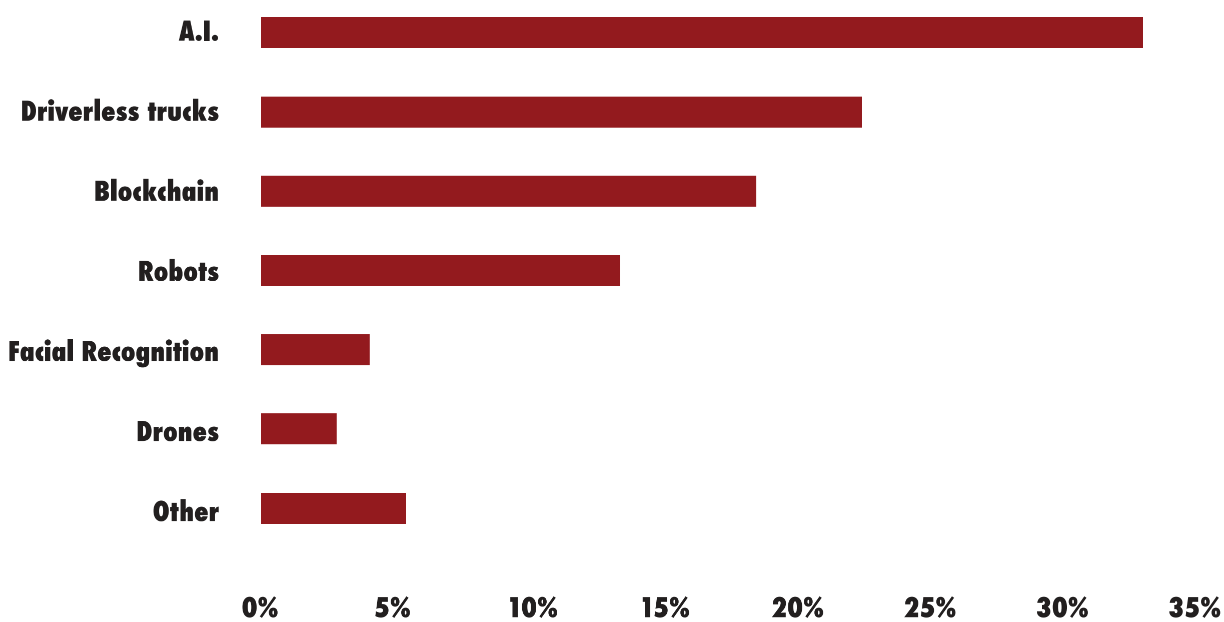
ROBOTICS, AUTOMATION AND VISIBILITY

One-day delivery seven days a week will require both more people and increasing automation in the near term. In the medium to long term, one could certainly argue that increasing automation will require far fewer human employees to help manage formerly manual tasks in the supply chain.

The transportation industry has been behind many other sectors of the economy in terms of modernizing, being quick to adapt and using innovative technology to move forward. This has changed in recent years as a great deal of private capital (both private equity and venture capital) has rushed in, looking to disrupt and automate key areas of transportation (particularly brokerage).

Respondents to our survey listed artificial intelligence, driverless trucks, blockchain and robots as the top technology trends that will impact their supply chains in the next two years. We agree with all of those but would push back slightly on driverless trucks

>> Which of the following technology trends will impact your supply chain in the next 1-2 years?



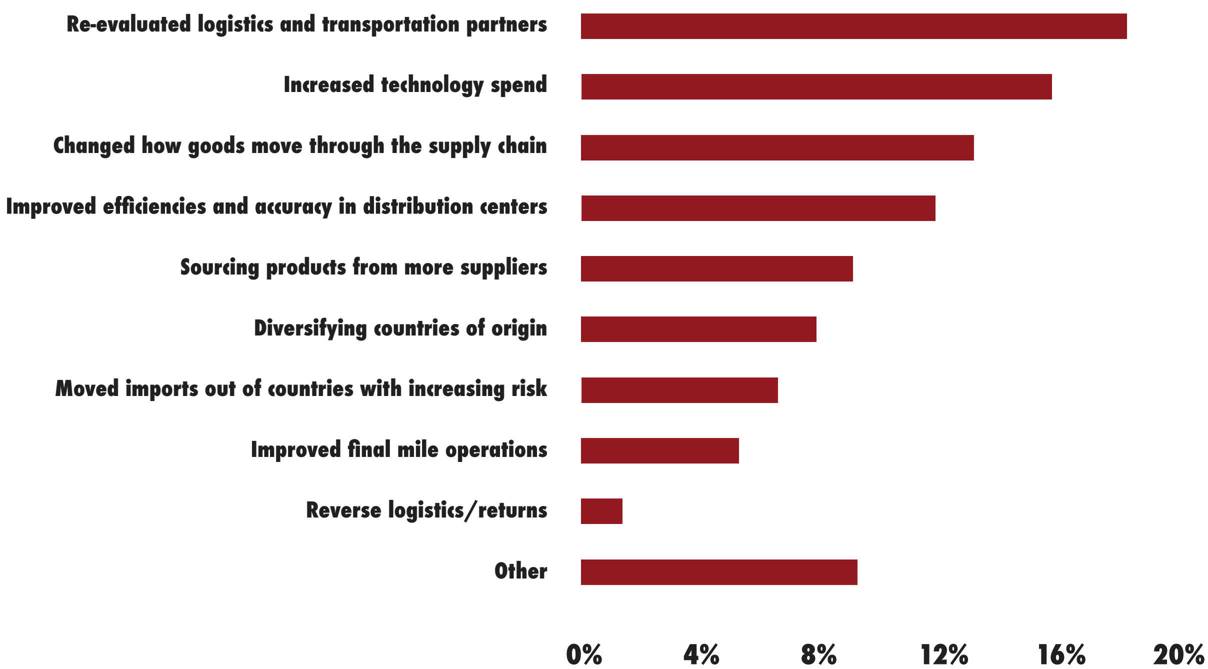
as we believe even minimal commercial activity associated with driverless trucks is likely still about a decade away. The recent winding down and lack of ability to raise new funding at Starsky Robotics is indicative of this being more of a long-term phenomenon in our view.

On the parcel side, UPS has announced a massive transformation initiative (in response to Amazon) in which multiple highly automated hubs are being built to increase parcel throughput by 35%. UPS, and others by way of greater automation, are hoping to not only increase speed and efficiencies, but also cut down on the margin erosion they have seen from the greater penetration of e-commerce. FedEx has announced similar ambitious investments aimed at automation and increasing throughout.

The impacts on transportation and supply chains from technology and automation will be felt through the implementation of increasingly strict on-time, in-full (OTIF) contracts and the use of technology to help transportation companies meet those requirements. For example, a shipper like Walmart may require vendors to have 98% of deliveries on time or otherwise result in fines and/or firing. New technology can aid in meeting this goal via warehouse management systems and transportation management systems (TMS) that allow for more supply chain visibility to meet and assess demand in real time.

The retailer respondents to our survey say they are re-evaluating logistics and transportation partners as the number-one way they have strengthened their supply chain over the past 12 months while increasing technology spend

>> How have your strengthened your supply chain over the past 12 months?



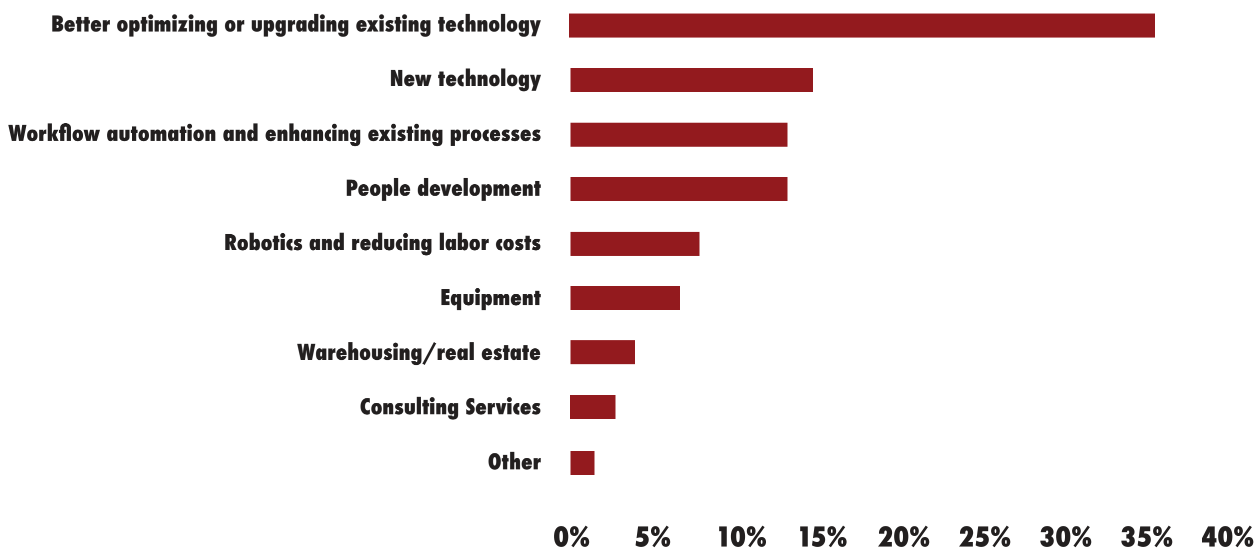
was a close second. The third and fourth top responses to the same question (changing how goods move through the supply chain and improving efficiencies and accuracy in distribution centers) involve heavy investments.

Interestingly, the heavy investment in technology for our survey respondents' supply chains will be mostly focused on better optimizing or upgrading existing technology as opposed to implementing new technology. The same theme was true when it came to investments in workflow automation and enhancements of existing processes.

Shippers are increasingly requiring carriers to have visibility systems to streamline the transportation process.

In the age of rapidly increasing e-commerce penetration, retail supply chains are increasingly becoming "just-in-time," and smarter, more efficient supply chain solutions will be needed to make this a reality.

>> How have you strengthened your supply chain over the past 12 months?



CONCLUSION

Aggressive changes are afoot in the retail supply chain landscape, and retailers that can skillfully navigate their business through these five major waves of change will come out on the other side as winners and cement their strong, competitive positions. Winning retailers of the next generation, in our view, will have a fast and efficient supply chain that can compete with the likes of Amazon; a strong online presence; competitive differentiation and consumer value propositions that stand out from America's top retailers; products and services that consumers want in a convenient format; a global diversified sourcing base that is not overly dependent on one country and that keeps up with the times and employs state-of-the-art supply chain technology.

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