



Intermodal Issues Affecting Real Estate

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30 April 2018

Executive Summary

Several key disruptors have emerged to transform the logistics industry in recent years



Port infrastructure has not been overlooked by most US ports upon the news of the Panama Canal expansion and increase in global trade but many cities have failed to improve inland infrastructure to support the investments made within the seaport



Autonomous trucking innovation has propelled many businesses to reconfigure supply chains driven by transportation costs



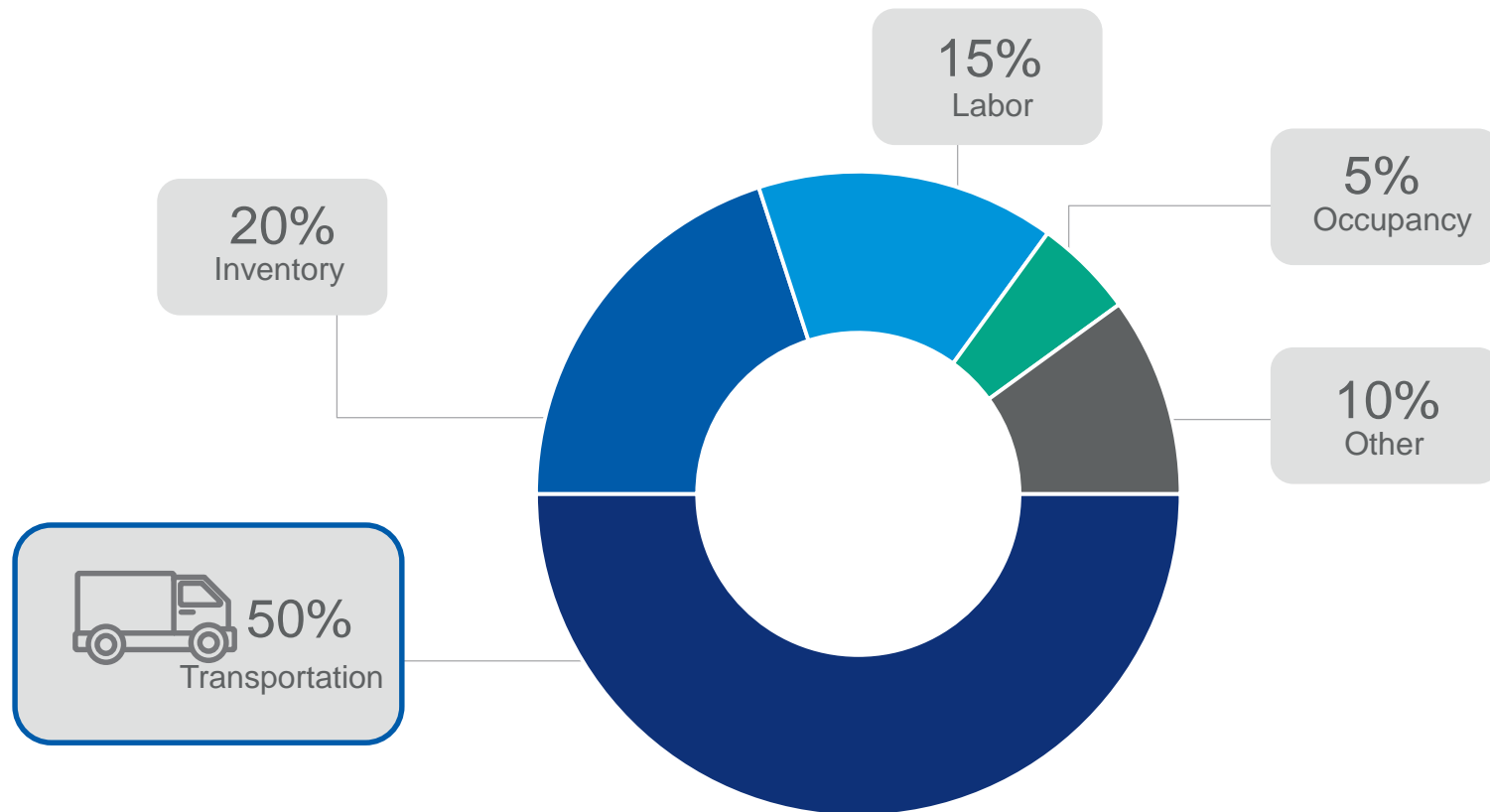
Warehouse automation is significantly impacting operational productivity within many distribution centers, while increasing efficiency and reshaping the overall warehouse framework

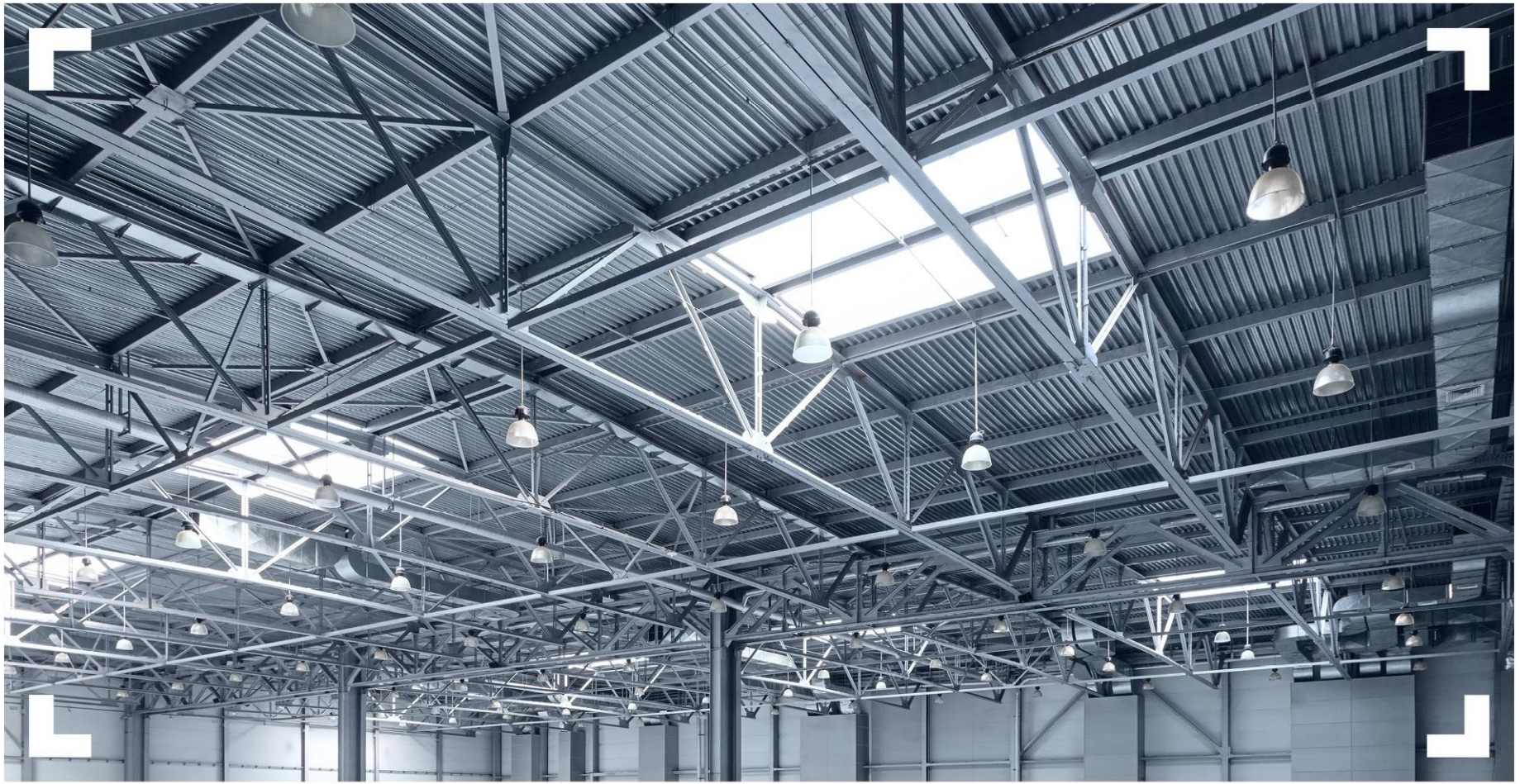
Global supply chain channels are increasingly adopting new, innovative technologies that will profoundly affect the real estate industry

Total Supply Chain Costs

Transportation comprises 50% of total supply chain costs, choosing the right industrial facility or third-party logistics company becomes critical

Supply chain costs breakdown





01

Disruptor: Port Infrastructure

US Ports Overview

Ports are continually undergoing improvements to cater to the increased size and activity from Post Panamax ships

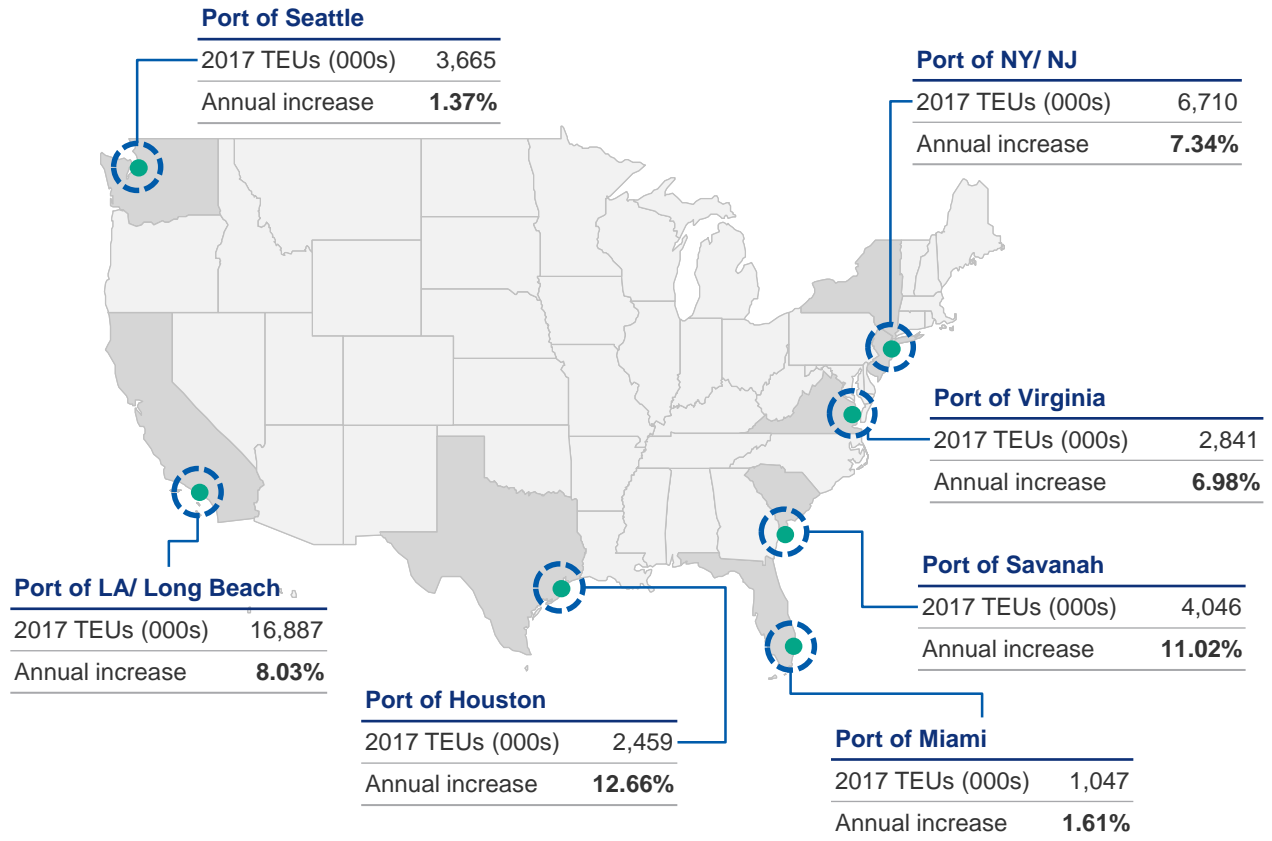
US seaports overview

2017 total port TEUs
45.4 m

2017 TEUs increase
7.3%

2012-2016 capital invested to modernize US ports
US\$ 46 bn

2016-2020 spending on port infrastructure planned
US\$ 155 bn

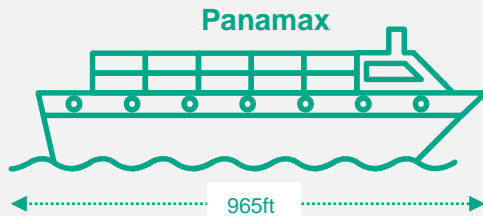


Major increase in capital investments due to inadequate infrastructure improvements over the past 5 years

Post Panamax Ships

June 2016, welcomed the first Post-Panamax ship, opening the gates for increased activity directed for major US ports

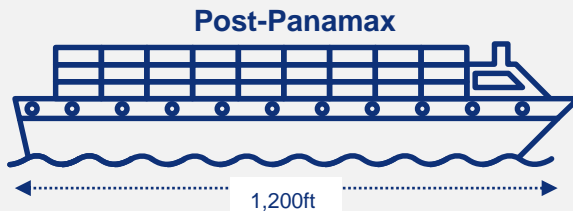
Original Ship Capacity



Prior locks

Maximum capacity of transiting vessels up to 4,400 TEUs

Expanded Ship Capacity



New locks

Maximum capacity of transiting vessels up to 14,000 TEUs

Panama Canal expansion impact on US ports

- Increased the lock width to 180ft, depth to 60ft and added an additional lane which doubled the cargo handling capacity
- BY 2020, 10% of container traffic will shift from west coast to east coast ports
- In 2017, total annual tonnage flowing through the canal increased by 22.2%
 - Total cargo for the year was 403.8 million tons, the highest amount on record
- Traffic is expected to double by 2030 in the five largest US ports



En route to the Port of NY/ NJ

Case Study: Port of NY/ NJ

The Port of NY/ NJ has been implementing port improvement projects in preparation for the increase in ship size and activity

Port of NY/ NJ



- Recently invested \$4.3 billion in port infrastructure improvement:
 - Mainly \$1.3 billion, for 64ft raise of Bayonne Bridge allowing 18,000 TEUs ships to travel under to reach terminals to the west
 - Recently completed a \$2.1 billion dredging of the channel to 50ft

Port Infrastructure

Many US port infrastructure investments are mitigated due to the poor quality of landside roads and inadequate land access improvements

Port of NY/ NJ

Failure to improve landside infrastructure coupled with increasing port activity is creating **trucking bottlenecks** at many US ports

In a recent survey, freight bottleneck congestion was estimated to cost shippers **\$63 billion** a year in delays



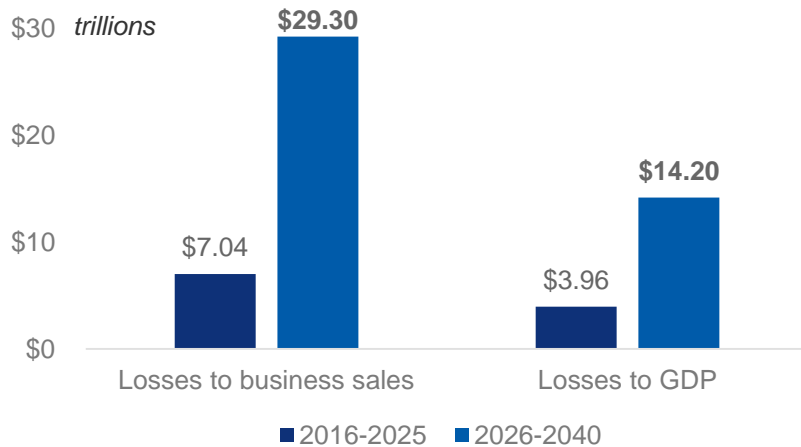
Major opportunity for industry disruptors



US Infrastructure

Deteriorating infrastructure will result in higher business costs, productivity will fall and GDP will drop

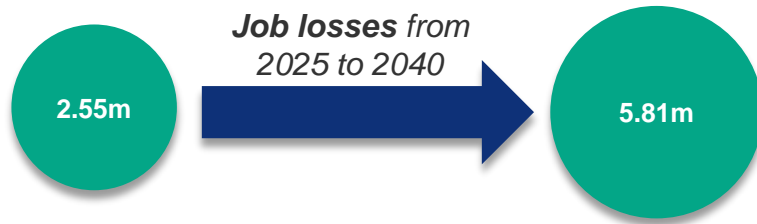
Failure to improve US infrastructure



Deteriorating infrastructure is affecting everyone



- increased travel time from poor roads
- delayed flights from outdated airports
- power outages due to neglected improvements
- increase in grocery costs due to longer/ inefficient supply chains



Research suggests countries with efficient logistics systems experience a **1% increase in GDP growth and 2% increase in trade**

Better infrastructure means a more efficient path to get the country's products into the **hands of consumers across the world**

Drayage Costs

Drayage costs become increasingly important as supply chain intermodal efficiency improve

Inland Empire drayage estimates (per container)



Drayage cost comparison

	Carson	Rialto
Building size (sf)	400,000	400,000
Doc doors	100	100
Daily utilization	35%	35%
Containers per day	35	35
Containers per year	9,100	9,100
Quoted costs per dray	\$359.00	\$654.00
Negotiated quantity discount	75%	75%
Est. net costs per dray	\$269.25	\$490.50
Annual drayage costs	\$2,450,175	\$4,463,550

\$2,013,375

Estimated annual drayage savings



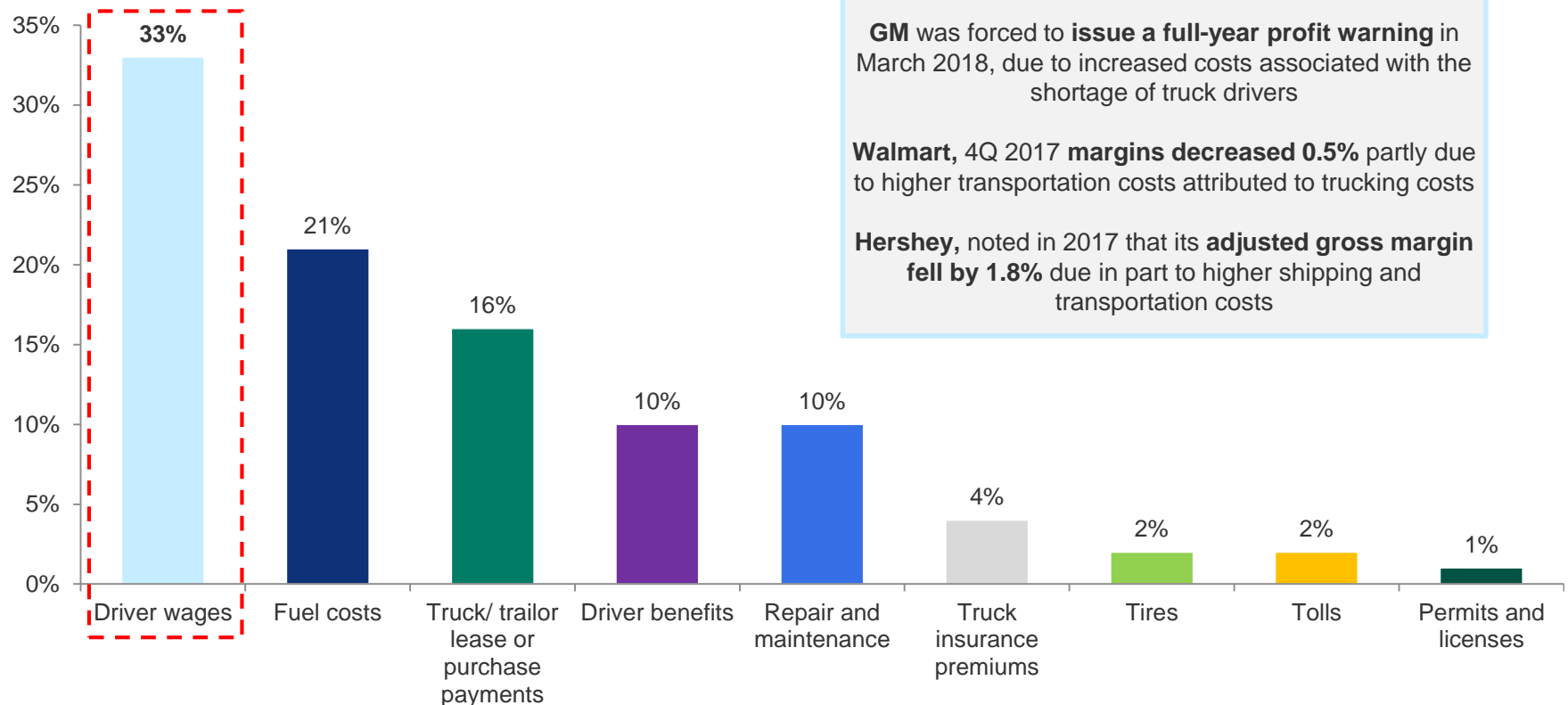
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Disruptor: Autonomous Trucking

Trucking Costs

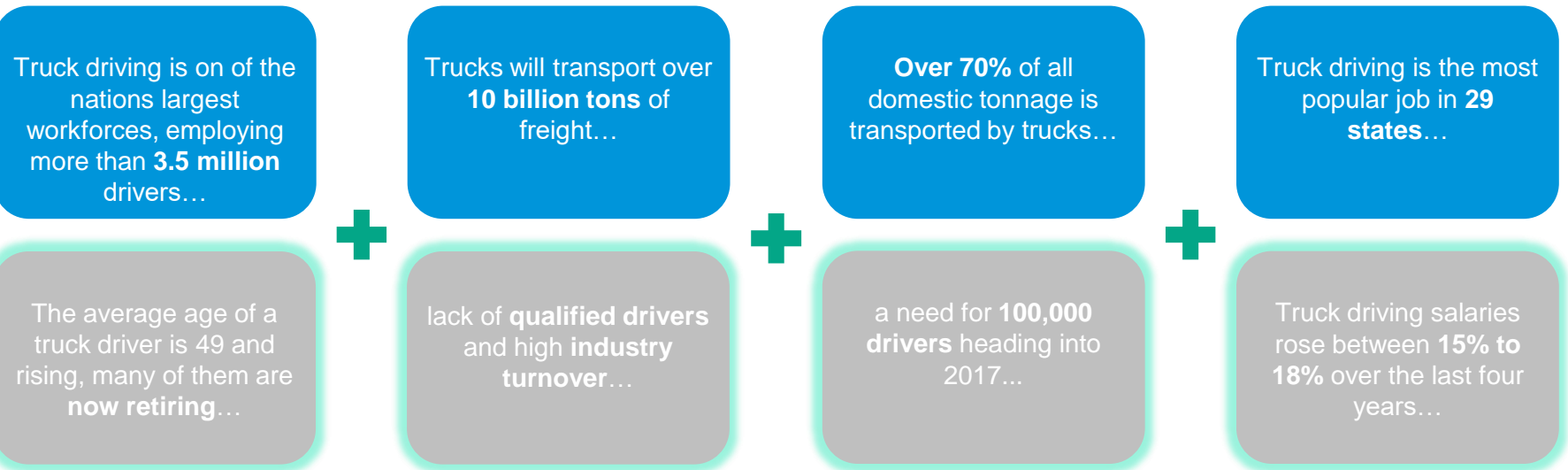
Trucking costs make up the majority of overall costs in many supply chains, disruptors have emerged within the industry to improve efficiencies intended to eliminate drivers

Trucking costs breakdown



Trucking Labor Force

The freight industry continues to grow but the work force has failed to keep up, creating a negative impact on many supply chains



INCREASED INCENTIVES FOR INNOVATION

Truckers are restricted to 70 hours of weekly driving per US federal regulations limiting them to a maximum of 3,000 miles of travel a week or 400 to 500 miles per day

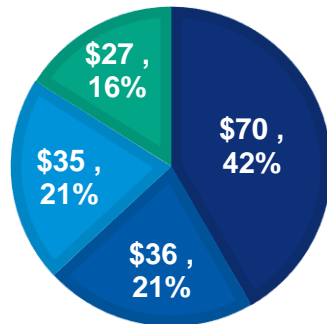
Combined, these factors have created a disconnect that has incentivized businesses to implement innovative solutions

Autonomous Trucking

Experts believe autonomous trucks will be a major presence on US roads by 2025

Autonomous truck savings breakdown

billions



- Labor
- Accidents
- Fuel Efficiency
- Productivity



TOTAL SAVINGS IMPACT

\$ **168+** BILLION

Savings annually from utilizing autonomous technology

New regulation was fully implemented in 2018 which limited truck drivers to 11 cumulative hours of driving in a 14 hour period (following a mandatory 10 hour rest period)
Further incentivizing industry disruptors

MARKET INNOVATORS



New regulation limiting drivers has incentivized operating companies to find a solution...

March 7, 2018 – Otto (Uber) announced that it has begun using self-driving trucks to haul freight on Arizona’s highways



March 9, 2018 – Waymo announced that its autonomous trucks would soon begin delivering freight for Google’s data centers in Atlanta



March 28, 2018 – Einride announced that the very first customer deliveries of its production T-pod (autonomous) truck will begin this fall





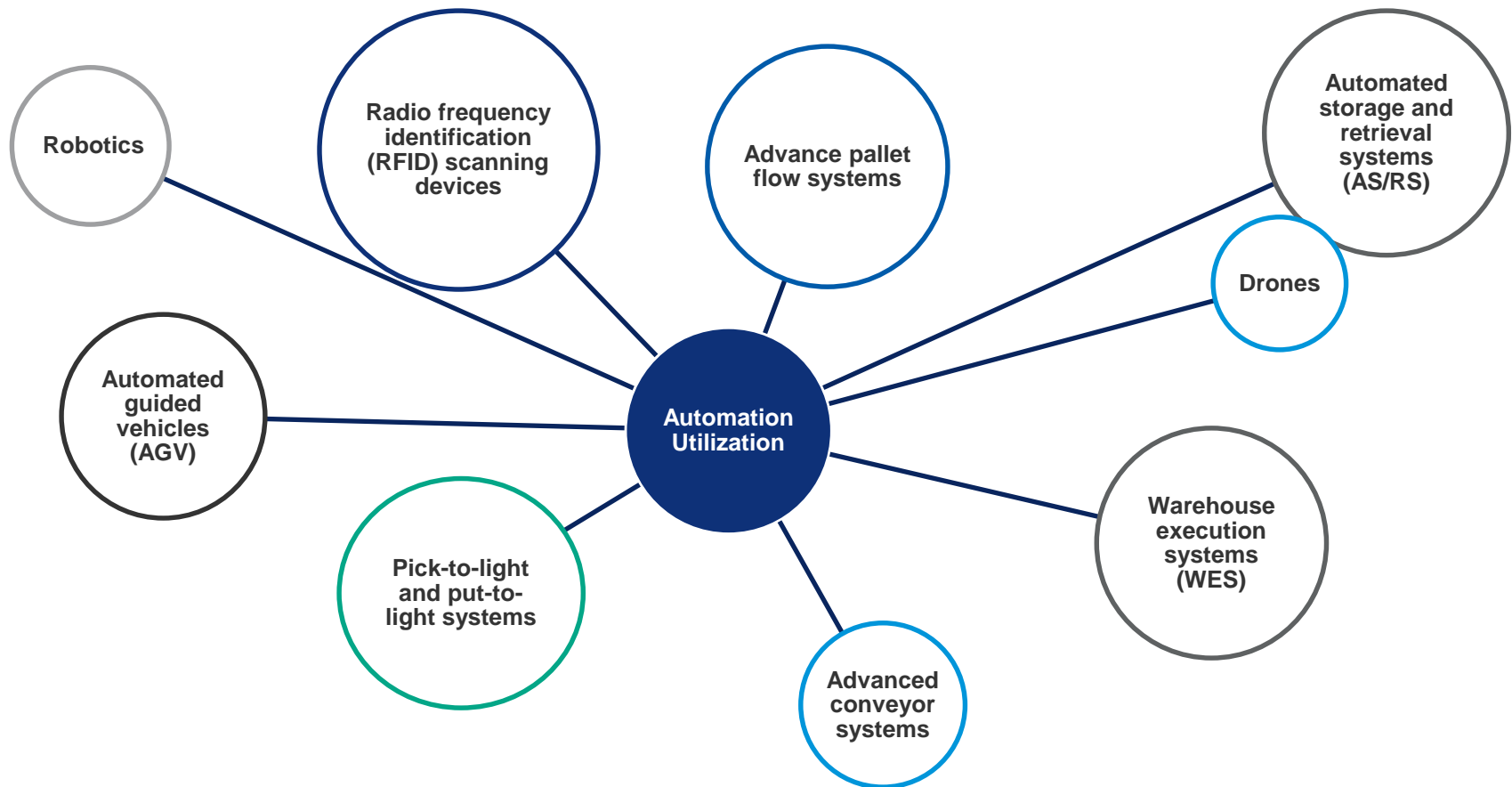
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Disruptor: Warehouse Automation

Automation Innovations

Businesses are implementing a wide variety of innovative technologies to automate the supply chain within ecommerce fulfillment centers while seamlessly increasing efficiency

Automation innovations



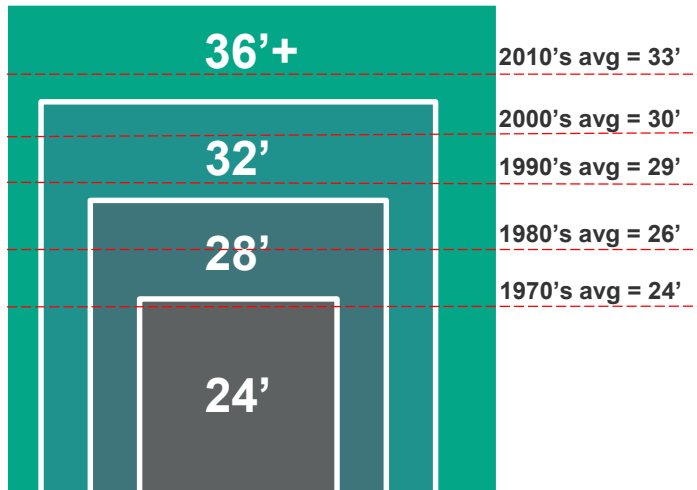
Modern Warehouses

Evolution of the warehouse has been attributed to improving technology in order to increase functionality and maximize space

Warehouse trends

- The average new warehouse completed in the US between 2012 and 2017 increased by **108,665 sf** (143%)
 - Additionally, **3.7ft** increase in clear height since the last development peak between 2002 and 2007
- The largest gains in average warehouse size came in markets with large, growing populations and a ready supply of developable land
 - Atlanta (284%), Cincinnati (237%) and Inland Empire (222%)

Warehouse clear heights



Average size of new buildings

Market	(2002-2007)	(2012-2017)	Average size increase (sf)
Atlanta	94,514	362,938	268,423
Inland Empire	105,057	338,473	233,416
Chicago	121,133	283,366	162,233
Dallas/ Ft. Worth	112,691	247,304	134,613
PA I-78/I-81 Corr.	430,216	555,236	125,020
United States	76,028	184,693	108,665



Modern Warehouses

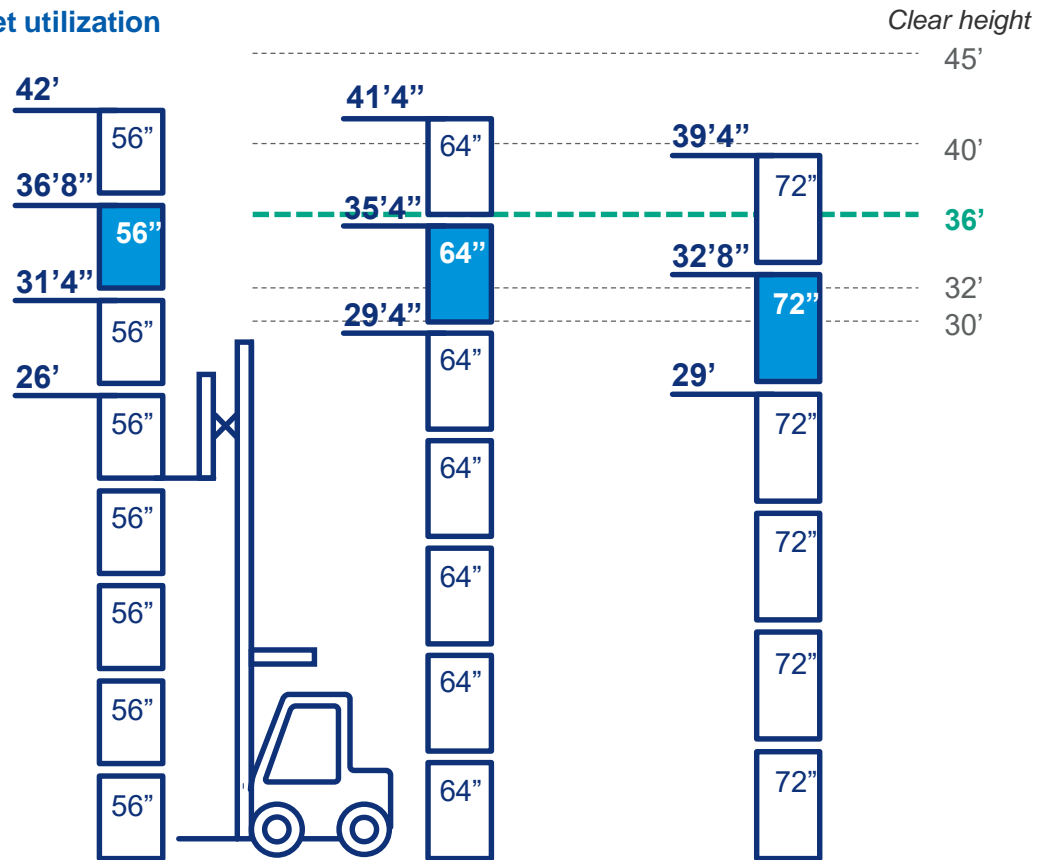
Warehouse automation has allowed for operators to maximize additional space

Distribution center clear heights and pallet utilization

It is estimated to cost ~\$1.25 per square foot to increase a buildings clear height from 32' to 36'

Over 50% of warehouse operators utilize 64" pallets

Going from 32' to 36' clear height can increase capacity by 10% to 25%



Warehouse Automation: Amazon

Amazon continuously invests and implements automation in order to maximize distribution center efficiencies

Amazon automation investments

Amazon invested in Kiva Robotics in 2012 for \$775 million



The addition of robots is estimated to reduce operating expense by 20% - **saving \$22 million in fulfillment expenses**



Amazon now has **100,000 robots deployed globally** – 25 of Amazon's 175 fulfillment centers are now armed with highly automated technology



Automation benefits

- Higher degree of efficiency
- Increased productivity
- Decrease in energy consumption and associated emissions
- Labor costs reduction
- Protection against labor shortage
- Optimize stock analytics
- Customization capabilities
- Decreased risk of processing errors
- Improved inventory management
- Advanced supply chain capabilities
- Reduce the amount of walking required of workers, making “pickers” more efficient
- Increase space availability with smaller aisles catered to robotics
- IT applications eliminate paper data entries