

## **Critical Issues in Trucking Workforce Development**

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REPORT 20-10

# CRITICAL ISSUES IN TRUCKING WORKFORCE DEVELOPMENT

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<b>16. Abstract</b> This white paper identifies research opportunities focused on workforce development for the trucking industry, particularly regarding truck drivers and the truck driver shortage. Interviews were conducted with key national and state trucking industry leaders. In addition, the authors gathered information from relevant sessions at the Transportation Research Board (TRB) Annual Meeting in January of 2020. The researchers also synthesized recent literature related to the trucking industry and workforce development. Key findings indicate that 1) the shortage may be a byproduct of "churn," where truck drivers are leaving not the industry, but their respective companies for other companies, which creates a capacity issue rather than a shortage of drivers; 2) Those entering the truck driving profession tend to be in their 30s with previous work experience not in the industry; 3) Trucking automation and platooning are far in the horizon and will not affect the demand for truck drivers; and 4) With new technology required for transparency, speed, accuracy, and collaboration in transportation and logistics, new workforce training opportunities are needed for trucking establishments. Implications for policy and practice include developing marketing, training, and retention strategies specific to this entering demographic of truck drivers and creating more accurate messaging to the public about the future of trucking industry jobs. Note that this research was conducted before the COVID-19 shelter-in-place policies were mandated.			
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## EXECUTIVE SUMMARY

With e-commerce surging and the trucking industry playing a vital role in the fulfillment process, truck drivers are in high demand. Assemblymember Jim Frazier, representing the 11<sup>th</sup> Assembly District and Chair of the Assembly Transportation Committee, requested a white paper outlining potential research topics for trucking industry workforce development.

The Quick Strike Analysis (QSA) identifies critical issues facing trucking workforce development in California including: future outlook for truck driving jobs with automation and other industry disruptors; legislation affecting the trucking industry and workforce development, including California Assembly Bill 5 (AB 5); training and upskilling truck drivers, including expanding target audiences; and sustainability models for reducing churn.

To identify relevant topics, the researchers interviewed key national and state trucking industry leaders, attended relevant sessions at the Transportation Research Board (TRB) Annual Meeting in January of 2020, and interviewed a variety of knowledgeable experts in the field and industry stakeholders. The researchers also synthesized current literature on trucking and workforce development; a review is included in this document. Note that this research was conducted before COVID-19 shelter-in-place mandates.

From the preliminary data gathered, the structure of this QSA coalesces critical issues of trucking workforce development into two prospective research opportunities:

1. Reframing Opportunities with New Messaging: The Future Outlook for Jobs in the Trucking Industry
2. Re-examining the Audience: Attracting, Training, and Retaining Truck Drivers

This QSA identifies strategies to address perception, recruitment, training, and retention aligning with the objectives of Senate Bill 1 (SB 1) transportation investment program to improve California's infrastructure while creating jobs. This paper is informed by research on driver categories, trends in supply chain and fulfillment, infrastructure inefficiencies, regulatory pressures, emerging technology, and the digitization of logistics and transportation systems as the background to understanding workforce development needs.

Industry experts report that automation and platooning are far in the horizon and will not affect the demand for truck drivers. Messaging to prospective drivers needs to reflect this reality to counteract the current inaccurate reporting in the media centered around the demise of the truck driving profession.

Trucking industry leaders and economists have debated whether the industry is facing a driver shortage or experiencing high turnover, or "churn." Research indicates truck drivers are sometimes leaving not the industry, but rather their respective companies for other companies. This churn, in turn, creates a capacity issue. Another element contributing to capacity issues include infrastructure shortcomings such as inefficiencies at ports.

High demand also exists for regulatory compliance positions for trucking companies, as well

as diesel and alternative fuels technicians and IT specialists in front/back office processes.

Another key finding is that those entering the truck driving profession tend to be in their 30s with previous work experience not in the industry. Marketing, training, and retention strategies therefore need to mirror this demographic. This QSA also introduces the ramifications of introducing younger drivers (ages 18-21) to the truck driving profession, particularly for long haul drives.

With the digitization of logistics and transportation systems, technology required for transparency, speed, accuracy, and collaboration require new workforce training opportunities for the trucking industry. Hours of Service (HOS) is a critical issue for the trucking industry because this federal regulation affects drive time. Industry insiders report nearly 30% of HOS are wasted because of operational inefficiencies in the cab. Suppliers and shippers, for example, can share data to increase efficiency and speed: orders, delivery, and storage information are uploaded onto shared platforms accessible to drivers. Manufacturers view tech-savvy drivers, those who understand how to use apps in the cab and who can communicate and manage data quickly and efficiently, as desirable. Further research is required to develop effective training curricula and designs that will resonate with the older demographic entering the truck driving field.

This QSA also acknowledges barriers to employment, including drug testing, loss of drivers' licenses, low credit scores, language, and cost barriers to CDL training. The QSA examines questions for further research, including: upon examining new entrants into the driving positions, what are the best practices for training and retention? It also asks: will online, virtual, and augmented reality platforms prove effective?

Recent research on stressors in the trucking industry point to promoting engagement or essential skills (formerly referred to as "soft skills") to improve relations between dispatcher and driver, and supervisor and driver. These recommendations may result in better truck driver performance and retention rates by increasing drivers' loyalty to the company, rather than loyalty mainly to the profession.

Further research concerning who is driving on our highways (average age, cross-border drivers, level of driving experience) and how they were initially trained (by carrier, community colleges, or through public workforce programming) can strengthen the workforce development research proposed in this QSA.

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## I. INTRODUCTION

This rapid-response Quick Strike Analysis (QSA) white paper identifies critical issues in trucking workforce development in California, including the following issues included in the white paper proposal:

1. Future outlook for truck driving jobs with automation and other industry disruptors;
2. Legislation affecting the trucking industry and workforce development, including California Assembly Bill 5 (AB 5);
3. Training and upskilling truck drivers, including expanding target audiences; and
4. Sustainability models for reducing churn.

This report is designed as a concept paper and is not intended to be an exhaustive study of critical issues in trucking workforce development. Further, this research was conducted prior to the onset of COVID-19 and its subsequent impacts on the supply chain, including trucking. As a result, COVID-19 is not considered as a contributing factor to the trucking workforce challenges addressed in this report. Through our research, we learned the four issues listed above are all tightly connected and interwoven. The structure of this QSA coalesces these issues of trucking workforce development into two prospective research opportunities:

1. Reframing Opportunities with New Messaging: The Future Outlook for Jobs in the Trucking Industry
2. Re-examining the Audience: Attracting, Training, and Retaining Truck Drivers

In turn, these research opportunities have discrete critical issues to be further explored. “Recommendation(s) for Further Research” identifies strategies to address perception, recruitment, training, and retention in the trucking industry, aligning with the objectives of the Senate Bill 1 (SB 1) transportation investment program to improve California’s infrastructure while creating jobs. Threaded throughout this QSA is the underlying recommendation from all our industry research sources: *Look at ways to retain drivers to reduce churn.*

## II. STUDY METHODS

CITT staff conducted direct interviews with key national and state trucking industry leaders and a nationally-renown labor economist from October of 2019 through February of 2020. We also attended relevant sessions at the Transportation Research Board (TRB) Annual Meeting in January of 2020, including the Trucking Industry Research Committee where we interviewed committee leadership. We leveraged and supplemented trucking industry research conducted with trade and industry associations in California, with a heavy preponderance of Southern California-based associations. CITT also synthesized government reports, peer-reviewed research, and industry association publications that could be applied to an academic study of workforce development trucking industry needs. A summary of the resources is included in this report.

### III. FINDINGS

#### STRUCTURE OF THE INDUSTRY

Supply chain and e-commerce trends, infrastructure, increased use of technology, and regulatory pressures are critical issues that affect the trucking industry. In addition, understanding characteristics and categories of trucking industry segments (Table 1) is necessary to examine workforce demands on trucking establishments.

#### PROFILE OF KEY TRUCKING INDUSTRY SEGMENTS

**Table 1. Profile of Key Trucking Industry Segments**

Drayage	Hauls cargo from shipping containers short distances within or near ports
Local Routes	Drives within a local range; <b>demand high because of increase in “last mile” deliveries</b>
Less-than-Truckload (LTL)	Requires multiple pickups and deliveries (P&D); often requires hauling of cargo from multiple companies; longer wait (detention) times
Dedicated Routes	Drives daily routes; has stable income; <b>regular schedules</b>
Full Truck Load (FTL or TL)	Requires less P&D so less wait (detention) times; trucks are larger
Over the Road (OTR), Regional, or Long Haul	Hauls cargo interstate or across the U.S.; may require crossing borders (Mexico, Canada); routes often irregular; may be compensated on a per-mile basis rather than a per-hour basis; compensation may depend on the type of cargo and the experience of the driver; <b>particularly hard to hire and retain; must be 21 or over to drive interstate</b>

Owner-Operators (O/O) must be granted operating authority, defined as permission by the government to be compensated to haul freight. Carrier size can range from one truck to tens of thousands. For-hire carriers, such as J.B. Hunt, offer carrier services to a variety of businesses. Companies can also haul their own freight using their private, or in-house, carriers.

#### GROWTH OF TRUCKING POSITIONS

The number of heavy and tractor-trailer truck drivers has increased from fewer than 1.6 million in 2012 to a projected 2 million drivers by 2026.<sup>1</sup> This growth in demand occurs at the national level but is even more pronounced in the southwest, including California (Table 2).

Of national metropolitan areas with the highest projected employment levels for heavy and tractor trailer truck drivers, two out of the top ten include regions in California: Los Angeles - Long Beach – Anaheim and Riverside – San Bernardino – Ontario.<sup>2</sup>

**Table 2. Occupational Projection for Heavy and Tractor-Trailer Truck Driver (SOC # 53-3032)**

State	2016 # of Employees	2026 Projected # of Employees	Change in # of Employees 2016-2026	% Change
California	147,500	165,000	17,500	11.9
Nevada	11,560	13,830	2,270	19.6
Arizona	25,770	29,190	3,420	13.3
New Mexico	10,630	11,190	560	5.3
Colorado	25,380	29,830	4,450	17.5
Utah	24,180	32,510	8,330	34.4
Texas	185,220	217,490	32,270	17.4
Oklahoma	24,890	26,850	1,960	7.9
<b>Southwest</b>	<b>455,130</b>	<b>525,890</b>	<b>70,760</b>	<b>15.5</b>
<b>National</b>	<b>1,871,700</b>	<b>1,980,100</b>	<b>108,400</b>	<b>5.8</b>

## TRUCK DRIVER TRAINING REQUIREMENTS

Truck driver training requirements involve a combination of written and in-the-cab assessments of a potential driver's skills. Each is an area of possible workforce development:

1. Pass the knowledge test and meet other federal requirements, after which they are eligible to pursue a commercial learner's permit.
2. Pass all three parts of the skills test—pre-trip inspection, basic control skills, and an on-the-road driving test—in the type of vehicle they intend to operate with their license.
3. Apart from the CDL requirements, some truck driving jobs (such as those that involve handling hazardous materials) require additional endorsements, and some employers require on-the-job training.

The Department of Labor (DOL) and other federal agencies administer programs that can be used to provide training for truck drivers. For example, DOL administers federal employment and training programs, such as those funded through the Workforce Innovation and Opportunity Act (WIOA), which provide training dollars that can be used by prospective truck drivers. Likewise, the Department of Education (DOE) provides federal student aid funds that can be used at eligible accredited trucking schools, and DOT and the Department of Veterans Affairs both operate programs that assist veterans interested in becoming truck drivers.<sup>3</sup>

## SUPPLY CHAIN AND E-COMMERCE TRENDS IMPACTING TRUCKING

Highly competitive e-commerce models of fulfillment substantially affect the trucking industry. Online shopping is outpacing spending at traditional retail outlets, thus necessitating increasing distribution and fulfillment options: "last mile" routes have been shrinking to accommodate this myriad of fulfillment models. E-commerce impacts transportation in terms of shipping costs, delivery times, expanded delivery locations, reverse logistics, inventory management (just-in-time inventory (JIT) principles), vertical integration (e.g., in-house transport as used

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by Amazon, Home Depot, Target, and Walmart), and outsourcing to third-party logistics providers (3PLs) that offer services to handle retailers' warehousing, distribution, and transportation needs.<sup>4</sup>

Truck trip characteristics reflect the growing decentralization needed for e-commerce: most notable is the decrease in average length-of-haul, which cuts across regional, national, and local routes. These operational trends are reflected in markedly higher employment in local pickup and delivery (P&D) operations and increasingly compressed delivery windows for fulfillment. Notably, some truck drivers prefer shorter hauls because they provide for more time at home, giving short haul carriers an advantage in attracting new drivers and retaining incumbents.

The impacts on truck drivers to deliver within these compressed time frames amid unforeseeable factors such as inclement weather, congestion, and warehouse delays affect driver retention and turnover rates, or churn.

## **TRUCK DRIVER SHORTAGE OR CHURN?**

Within trucking industry stakeholders, heated debate surrounds the question of whether the industry is facing a driver shortage, or if it is facing churn.

A labor shortage is when the market is operating at a disequilibrium. While fluctuations of market forces are normal from time to time and eventually attain equilibrium, it is not normal for a market to remain at disequilibrium for over a decade. Findings indicate that churn amplifies the driver shortage. Wages influence the labor market: high wages attract more individuals to the market and low wages discourage individuals from entering. A shortage can be alleviated in the short run by increasing wages and alleviated in the long-run by developing a new supply in response to higher wages. Drivers may leave their companies, but not the industry: "[O]nce carriers start recruiting [to combat churn], turnover becomes permanent. Turnover works as a market shock absorber."<sup>5</sup> Studies by the Owner-Operator Independent Drivers Association similarly show a decrease in drivers at large carriers and a shift for truck drivers to become owner-operators or join smaller fleets.<sup>6</sup> An American Trucking Association (ATA) report found carriers with over \$30 million in annual revenue had a 98% turnover rate.<sup>7</sup>

The ATA and its research arm, the American Transportation Research Institute (ATRI), on the other hand, have listed driver shortage as one of the most critical issues for the past several years. ATRI cites a need for over 60,000 drivers to meet demand.<sup>8</sup>

Both shortages and churn affect the truckload (TL) sector more than the less-than-truckload (LTL) sectors. TL refers to those hauling an entire truckload of goods; LTL refers to drivers making more pickup and deliveries and hauling goods shorter distances. ATRI cites driver turnover percentages around 90% for the TL sector, while the turnover rate for local and LTL carriers is approximately 10%.<sup>9</sup>

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## **CONSOLIDATION FROM ALLIANCES AT THE PORTS: AN EXAMPLE OF DECREASED TRUCKING CAPACITY DUE TO INFRASTRUCTURE AND OPERATIONAL INEFFICIENCIES**

Infrastructure and operational inefficiencies can exacerbate trucking capacity issues. As an example, shipping lines have created vessel sharing agreements for greater efficiency and reduced costs at the ports. These vessel sharing agreements, also called alliances, call for the usage of common port resources, such as ships, port terminals, and chassis (the trailers that hold the container on a truck). Alliances, however, have created inefficiencies for the trucking industry, particularly for the drayage sector. Drayage refers to trucking establishments that transport container cargo from vessels short distances, often within or near the ports.

With the alliances came critical operational inefficiencies at the port, resulting in longer wait times for drivers and the need for double the number of drivers from pre-alliance years. Compounding this lack of coordinated infrastructure at the ports are port labor practices that also increase driver wait times and reduce trucking capacity.

## **INCREASED USE OF TECHNOLOGY IN TRUCKING**

Disruptive technology that has changed the nature of tasks associated with truck operations will be discussed in this QSA: telematics (using information technology to monitor driver behavior and other metrics such as fuel usage), shared platforms for freight load matching, use of Electronic Logging Devices (ELDs), front/back office automated processing, use of driver assist devices, among others. These technologies provide for more transparency, increased efficiency and speed and require extensive workforce training of trucking establishment staff.

## **REGULATORY PRESSURES**

Trucking establishments face regulatory pressure at the local, regional, state, and federal levels. While there is increased environmental regulation, truck drivers also face regulatory constraints such as limited hours of driving and rising equipment, fuel, and operation costs affecting the companies' bottom line.

To understand the plethora of regulations, we present a chart that shows a sample of regulatory compliance measures. A brief summary of major regulatory bodies and regulations follows.



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## FEDERAL, STATE AND REGIONAL AND LOCAL REGULATORY BODIES & REGULATIONS

Federal	Federal Highway Administration, Federal Motor Carrier Safety Administration, Federal Excise Taxes, Hours of Service, Electronic Logging Devices, Customs and Border Protection, Environment Protection Agency, Occupational Safety and Health Administration, Transportation Safety Administration
State	Assembly Bill 5, Truck and Bus, Tractor-Trailer Greenhouse Gas, California Highway Patrol (CHP), California Environmental Protection Agency (CalEPA), Department of Toxic Substances Control (DTSC), State Waters Resources Control Board (SWRCB) for hazardous materials, California Air Resources Board (CARB), Senate Bill 1 (SB-1) fees
Regional and Local	Port Drayage Registry, Uniform Intermodal Interchange and Facilities Access Agreement (UIIA), California Air Action Plan (CAAP), business permits, route restrictions, labor practices, Basic Inspection of Terminals (BIT)

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### FEDERAL EXCISE TAX (FET)

The retail sale of most new heavy-duty trucks now faces a 12% federal excise tax imposed by Congress. This tax may lower the number of heavy-duty truck sales, including sales of cleaner, safer, and more fuel-efficient trucks. FET was initiated in 1917 to help pay for World War I. Since the start of implementation, the tax has risen from 3% to 12%. Rationale for the trucking industry opposition to this tax: 1) it is the highest tax on most new heavy-duty trucks; 2) it hinders incentives to buy cleaner and safer trucks; and 3) FET does not generate a large portion of revenue.<sup>10</sup>

### HOURS OF SERVICE (HOS) OF DRIVERS

HOS regulates the number of hours a truck driver can drive per day and week given certain criteria. This regulation exists to ensure truck drivers are well-rested for the safety of the driver and others on the road. The federal regulation has different standards for property-carrying drivers and passenger-carrier drivers. Depending on the driver classification, the driver is required to take a number of consecutive hours off duty to rest after driving a maximum number of hours. As a truck driver would put it, “If the wheels aren’t turning, we aren’t earning.” As a result, slip – seating is a method for truck drivers to keep the truck moving by having a second driver take the wheel at the end of the limit.

### ELECTRONIC LOGGING DEVICES (ELD)

Like the Hours of Service of Drivers (HOS) regulation, the ELD rule intends to help create safer driving environments. ELDs make it easier to track, report, and share records of duty status (RODS) data. The ELD rule applies to most motor carriers who are required to maintain RODS, although some exceptions apply.<sup>11</sup>

### ENTRY-LEVEL COMMERCIAL MOTOR VEHICLE OPERATORS COMPLIANCE

In 2016, the Federal Motor Carrier Safety Administration (FMCSA) amended the regulation “Minimum Training Requirements for Entry-Level Commercial Motor Vehicle Operators.”

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The regulation established training standards for certain individuals applying for their commercial driver's license (CDL) for the first time. Such individuals must complete the entry-level driver training (ELDT) requirements and "complete a prescribed program of instruction provided by an entity that is listed on FMCSA's Training Provider Registry (TPR)."<sup>12</sup> Certification information will be sent to State Driver Licensing Agencies (SDLA) who may administer CDL skills tests to eligible participants. In January 2020, the compliance date for the Entry-Level Driver Training was extended from February 7, 2020 to February 7, 2022 so that FMCSA can complete the development of the Training Provider Registry (TPR), which allows training providers to prove their ability to meet training requirements. FMCSA is extending the entire implementation rather than delay the phases that were initially introduced. This extension is due to unforeseen circumstances overlooked at the time the proposed rule was published.<sup>13</sup>

### **ASSEMBLY BILL 5 (AB 5)**

Also known as the "gig worker bill," California's AB 5 requires companies that hire independent contractors to reclassify them as employees. Under this new classification, former independent contractors are owed minimum wage, overtime, and unemployment insurance, workers' compensation, paid sick days, paid family leave, workplace protections against harassment and retaliation, and the right to form or join a union.<sup>14</sup> On December 31, 2019, however, a federal judge disputed the regulation among trucking companies, extending a temporary ban on enforcement of the measure while an industry challenge plays out in court.<sup>15</sup> While the bill has supporters and detractors, the California Trucking Association and the Western States Trucking Association have expressed their opposition to the bill and its threat to end the use of independent contractor truck drivers. This bill potentially threatens over 70,000 independent truck drivers.<sup>16</sup>

### **TRUCK AND BUS REGULATION**

The Truck and Bus regulation is a California law implemented by the California Air Resources Board (CARB) in order to meet federal attainment standards. In an effort to reduce toxic air contaminants (TACs), particulate matter, and oxides of nitrogen emissions from heavy-duty diesel vehicles, nearly all trucks and buses are required to install a 2010 engine or newer. This regulation pertains to heavy-duty diesel vehicles that operate in California. Starting in 2020, only compliant vehicles with the regulation will be registered by the California Department of Motor Vehicles.<sup>17</sup>

### **TRACTOR-TRAILER GREENHOUSE GAS (GHG) REGULATION**

Aerodynamic tractors and trailers equipped with low rolling resistance tires will be required to reduce greenhouse gas emissions produced by certain heavy-duty tractor trailers. This CARB regulation pertains primarily to owners of 53-foot or longer box-type trailers. All owners must be compliant to the regulation when operating on California highways, regardless of where the vehicle is registered.<sup>18</sup>

**PORT DRAYAGE TRUCK REGISTRY**

Trucks entering the Ports of Los Angeles and Long Beach must be a 2014 model or newer. Failure to comply will result in a citation. The trucks targeted are identified as contributing large amounts of harmful pollutants toward port operations. This is an effort to contribute toward the Clean Truck Program, where all trucks entering the marine terminals must be on the Port Drayage Truck Registry.

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## **IV. POLICY/PRACTICE RECOMMENDATIONS: RESEARCH NEEDS FOR NEW MESSAGING**

These issues affecting the industry translate into possible areas for future research. We outline them in the next three sections.

### **REFRAMING OPPORTUNITIES WITH NEW MESSAGING: THE OUTLOOK FOR JOBS IN THE TRUCKING INDUSTRY**

#### **Misinformed Public Perception of the Truck Driver Profession**

Public perception of the future work prospects of truck drivers is often one of doomsday: autonomous trucks and platooning will lessen the demand for truck drivers; the job is “dirty;” the job provides scant opportunity to move up within the company. With this misinformed messaging, who would want to enter this profession? Accurate messaging concerning the training needs and outlook for truck drivers is critical to attract and retain drivers.

#### *Recommendation for Further Research*

Develop strategies to inform the public of the current realities of trucking today, as described in this section.

#### **Timeline for Full Automation and Platooning**

Platooning involves one or more trucks following closely behind a lead truck linked by wireless communication. Automated trucks, including self-driving trucks, and platooning will most likely affect long-haul drivers the most. The Department of Transportation (DOT), ATRI, and Bureau of Labor Statistics (BLS) researchers collectively agree that disruptive technologies such as platooning and autonomous trucks are far in the horizon, perhaps years to decades (for self-driving trucks, in particular) in the future. According to the Government Accountability Office (GAO), “technological, operational, infrastructure, legal, and other factors may affect automated truck development and deployment.”<sup>19</sup>

Trucking jobs require more than driving: drivers also perform a variety of other tasks not easily automated, including managing emergencies, vehicle fueling and maintenance, loading, unloading, and securing cargo, and documentation tasks.

#### *Recommendation for Further Research*

Identify data to show there is and will still be a high demand for truck drivers – particularly experienced drivers – in the foreseeable future.

#### **Freight Technological Advances**

The digitization of transportation with cleaner and more efficient equipment is changing the face of trucking. A strategy to reimagine the perception of the trucking industry is to market

the truck driving profession with comparisons to a pilot, with new freight technology in the cab. A few examples are the Volvo Lights project and the Autonomous Vehicle Driver and Operations Specialist Certificate Program in Pima, Arizona.

Volvo Lights, a union of public and private stakeholders, including the California Air Resources Board, is investing \$44.8 million in Inland Southern California to reduce emissions from goods movement trucks and will demonstrate the ability for heavy-duty, battery electric trucks to move freight between Los Angeles's two major ports and warehouses throughout the region.<sup>20</sup>

In recruiting future drivers, exposure to NextGen jobs may prove effective. As an example, Pima Community College in Pima, Arizona, has an Autonomous Vehicle Driver & Operations Specialist Certificate program that concentrates on the basics of hardware components, fundamental electronics, safety, health, and environmental regulations, and domestic freight transportation.<sup>21</sup>

### *Recommendation for Further Research*

Identify freight technology advancements that are clean and efficient to recruit potential truck drivers.

### **New Models for Advancement Potential for Truck Drivers**

Accurate messaging to prospective drivers can show new models of advancement potential, where relatively new drivers can plug into the tech vertical. Sample career pathways, as described by a trucking industry expert, follow:

- Start as a dispatcher, in distribution and warehousing, or in yard operations, then move to managerial positions that lead to director positions.
- Start as a truck driver who effectively uses digital apps. These drivers have high value to Original Equipment Manufacturers (OEMs) for their training potential to teach drivers unfamiliar with apps. These tech-savvy truck drivers can move up to manager status quickly.
- Start as an employee driver, then become an independent contractor. Start a business as an owner-operator with his/her own operating authority, then move to own a motor carrier establishment. Although becoming an owner operator is increasingly difficult because of prohibitive costs, it is still an option for some truck drivers.

### *Recommendation for Further Research*

Explore other models of advancement for drivers and identify training needs for vertical movement within establishments.

**Other In-Demand Trucking Industry Occupations: Automotive Technicians, Front/Back Office Operations Staff, Compliance Officers**

A high demand for diesel technicians correlates to the attrition of baby boomer mechanics. In tandem is the high demand for alternative fuels technicians to work on hybrid, electric, hydrogen fuel cell powertrains. Further, to address the automation of front/back office processes, these positions will require workforce competencies that require knowledge of telematics, shared platforms, and other management applications that are conducive to transparency and efficiency.<sup>22</sup> With the headwind of regulatory compliance for trucking companies and rapid increase in last mile operations (and concomitant unsafe driving or parking violations), staff with compliance expertise is increasingly in demand. Bently and Robinson's 2019 study examining churn and the stressors drivers face suggests training in compliance increases retention rates within the establishment.<sup>23</sup>

*Recommendation for Further Research*

Research other high-demand trucking industry occupations and the workforce competencies required for training.

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## **V. POLICY/PRACTICE RECOMMENDATIONS: RESEARCH NEEDS FOR MARKETING AND ADDRESSING BARRIERS TO EMPLOYMENT**

### **RE-EXAMINING THE AUDIENCE: WHO DO WE MARKET TO AND HOW DO WE TRAIN AND RETAIN DRIVERS?**

#### **Characteristics of Truck Driver New Hires: They Are Older**

The target audience for truck driver recruitment, training, and retention efforts should mirror the cohort entering the industry as drivers. BLS data shows the characteristics of people entering as drivers haven't changed much in twenty years: they have worked in another industry prior; have come from industries such as warehousing and manufacturing; and they are in their mid-30s.<sup>24</sup> For a recent pilot California Community College truck driver training program, the ages of entering students were from the 40s through early 50s. Similar to the BLS data, this program's participants came from warehousing, manufacturing, service, and retail jobs; some worked as laborers, while others were veterans. Upon entering the trucking profession in their 30s through early 50s, there is a constant need to recruit because the drivers may only remain in the industry for 10 years before leaving, which is another factor affecting churn.

#### **Marketing to This Cohort**

When marketing to the cohorts who are entering the truck driving profession, where should marketing and recruitment take place? ATRI suggests using flexible and mobile recruitment tools, such as using phone messaging and apps to market to prospective drivers.

#### *Recommendation for Further Research*

Develop strategies to effectively market truck driving as a profession to this targeted demographic audience: those who are in their mid-30s and older.

#### **What Is the Desirability Of 18-21-Year-Old Truck Drivers?**

The FMCSA prohibits interstate truck driving for drivers younger than 21. The National Safety Council recommends maintaining the age threshold of 21 for truck drivers citing that large truck drivers under the age of 21 were over-involved in fatal crashes by a factor of six.<sup>25</sup> Further, younger cohorts may not be the best demographic in an occupation that requires high collaborative and problem-solving skills,<sup>26</sup> in addition to one to four years of truck driving experience (a benchmark often set by carriers). Trucking companies are looking for ways to retain these younger drivers in their yards so that by the time they are 21, they can take a promotion and become CDL Class A truck drivers. Liability and workmen's compensation costs, however, often prohibit employers from hiring this younger cohort.

ATRI is advocating a "graduated CDL" concept where driver candidates between 18 and 20 are trained during the intra-regional and local haul routes now in high demand (with

e-commerce), then transition as more experienced drivers migrate to interstate operations.

### *Recommendation for Further Research*

Examine the landscape of 18-21-year-olds entering the workforce as truck drivers, particularly as OTR drivers.

### **Barriers to Truck Driver Employment**

According to ATA, carriers must reject 90% of driver applicants because they don't meet the prerequisites for interstate commerce: barriers to job entry cited by ATA include age requirements, CDL standards, drug and alcohol testing, and safe and clean driving records.<sup>27</sup> Cost barriers to CDL training, language barriers, and low credit scores also prohibit entrants to the field.

### *Recommendation for Further Research*

Examine barriers to truck driver employment and strategies to address them.



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## **VI. POLICY/PRACTICE RECOMMENDATIONS: RESEARCH NEEDS FOR TRAINING**

### **TRAINING FOR MORE EFFICIENT USE OF HOURS OF SERVICE (HOS) AND USE OF ELECTRONIC LOGGING DEVICES (ELD)**

Advances in freight technology allow more efficient use of HOS. One of the reasons for churn is the wasted HOS for drivers who aren't using technological advances that promote speed and efficiency. National carrier J.B. Hunt estimates approximately one-third of HOS is wasted: "We don't think there's a driver problem. The problem is access to information on available capacity."<sup>28</sup> Therefore, training for drivers should include the use of smartphone apps to be able to access load and scheduling data through shared mobility platforms. For older new-hire drivers and incumbents, training in the use of apps is critical to decreasing churn.

Use of the congressionally-mandated Electronic Logging Devices (ELDs) that synchronize a vehicles' drive time for easier and more accurate HOS documentation requires driver training as well.

### **TRAINING IN ACTIVE DRIVER ASSIST TECHNOLOGY AND OTHER EMERGING TECHNOLOGY**

Training in active driver assist devices (ADAS) such as Light Detection and Ranging (LIDAR) sensors, GPS, radar, cameras, and lane change technology is necessary for all drivers for safety. To enhance cargo fluidity within ports, real-time video technology that enables drivers to see traffic levels on key arteries within the Port of New York and New Jersey is available for truck drivers. Use of these technologies, as well as training in averting driver distraction, is now required as truck drivers are navigating and communicating through apps and other technologies while in the cab.

#### **Recommendation for Further Research**

Develop curricula and research strategies to teach new hire drivers and incumbents how to use emerging technology in the cab.

### **TRAINING IN WORKFORCE ESSENTIAL/ENGAGEMENT SKILLS FOR RETENTION: EMPOWER THE DRIVER**

Driver churn could be decreased if the relationships developed between dispatcher and driver, and supervisor and driver show elements of what researchers Bently and Robinson call "efficacy."<sup>29</sup> Efficacy refers to the drivers' sense that they have some autonomy in decision-making. With telematics reporting on many facets of a truck drivers' actions, feelings of efficacy can be very low for drivers. Bently and Robinson suggest that to reduce burnout, supervisors of trucking companies can provide support and respond constructively to drivers. Supervisors are also encouraged to observe the work conditions of drivers in order to improve operations and offer a means of coping, allowing drivers to influence and

make decisions. These recommendations, the researchers suggest, may result in better truck driver performance and retention rates by increasing drivers' loyalty to the company, rather than loyalty mainly to the profession.

### **Recommendation for Further Research**

Research specific essential or engagement skills required to increase driver retention by strengthening drivers' sense of efficacy.

### **DELIVERY OF TRAINING: ONLINE, VIRTUAL AND AUGMENTED REALITY PLATFORMS**

Online, VR, and AR platforms may prove to be effective training delivery methods for training drivers. Hardware-agnostic training programs can lower costs of training, particularly for smaller establishments.

### **Recommendation for Further Research**

Research the benefits and drawbacks of using online, virtual, and augmented reality platforms for driver training modules.

### **CONCLUSION**

Other strategies to retain truck drivers and reduce churn include addressing parking, driver health and safety, company branding, and truck stop amenities.

Besides the recommendations for further research we presented concerning truck industry workforce development, further research concerning who is driving on our highways and how they are initially trained (by carrier, community colleges, or through public workforce programming, for example) can strengthen this workforce development research we are proposing in this QSA.

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## VII. REVIEW OF SOURCES: TRUCKING INDUSTRY RESEARCH IN WORKFORCE DEVELOPMENT

This section summarizes key literature that underscores the challenges and issues outlined in this paper. It is not designed to be an exhaustive review of trucking workforce literature; rather we highlight sources that address similar questions relating to trucking. Summaries of peer-reviewed research, government reports, and industry association publications are included below. They further support the need for the kinds of future research outlined above.

### PEER-REVIEWED ACADEMIC STUDY

#### **The People Behind the Wheel: Exploring the Policy Changes, Job Characteristics, and Social Stressors Driving Turnover Among California Truck Drivers**

In an effort to evaluate factors impacting truck drivers, this paper outlines three studies: 1) effects of policy changes on drivers; 2) effects of job characteristics on drivers; and 3) effects of identity issues on driver. Data was collected by surveying 100 owner-operated truck drivers based out of two companies located in California.

The findings in order of each study are as follows: 1) Changes in national policy are more stressful than state policy changes; drivers are not concerned about automation taking over their jobs; most drivers experience exhaustion; drivers have an intention to stay with their company (which was unexpected given high turnover rates among the profession). 2) The most common job characteristics from highest to lowest frequency include hazardous exposure, skill discretion and emotional demands, physical exertion, and work and time pressure. Skill discretion is the only challenge stressor as it negatively correlates to burnout constructs (i.e. inefficacy, exhaustion, and cynicism); skill discretion is positively associated with both job performance and citizenship behavior; hazardous exposure and emotional demands do not affect job performance or intent to remain at a company; there is no association among physical exertion and stress; work/time pressure is a hindrance stressor that demotivates a worker to remain with the company. 3) Truck drivers do not experience daily bullying or derogative expressions from society; bullying behavior is strongly linked to burnout constructs; driver organizational identification was closer to their profession than to their organization; drivers who identify with the organization and profession experience the highest levels of stress.<sup>30</sup>

The authors recommend supervisors of trucking companies provide support and respond constructively to drivers in order to reduce burnout. Supervisors are also encouraged to observe the work conditions of drivers in order to improve operations and offer a means of coping; allowing drivers to influence and make decisions can be perceived as a reward. Finally, it is recommended companies respect and encourage truck drivers to feel pride in their profession. These recommendations are expected to result in better truck driver performance.

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## INDUSTRY ASSOCIATION PUBLICATIONS

### The Economics of Transportation Labor & Autonomous Trucking

The trucking industry experiences truck driver shortages. Trucking companies explain there are not enough drivers to make deliveries, resulting in the truck driver shortage; however, Kristen Monaco's recent study challenges the fundamental belief of a truck driver shortage. Instead, her findings indicate that high turnover rates, known as churn, amplify the driver shortage. Churn is the result of each job requiring similar skills, allowing drivers to easily switch between companies. This labor market activity does not indicate a shortage because the labor demanded does not constantly exceed labor supplied. Monaco also addresses the challenges of acquiring a truck driving job, which can discourage attracting a younger demographic. Such challenges include required years of experience and clean driving records.<sup>31</sup>

### Critical Issues in the Trucking Industry – 2019

The American Transportation Research Institute (ATRI) conducted a study to determine the top concerns in the industry. Their methodology involved a survey in which stakeholders across North America participated. The top 10 concerns are as follows: <sup>32</sup>

1. Driver shortage: Over 60,000 drivers are needed

*Top Proposed Strategy: Advocate for the development of an apprenticeship program to attract 18-20-year-olds.*

2. Hours-of-service (HOS): Limits the number of consecutive hours a driver can drive

*Top Proposed Strategy: Continue to push for increased flexibility in sleeper berth provision.*

3. Driver compensation: Companies are offering higher wages to truckers to attract more drivers. There is a concern that drivers aren't earning enough, given wait times and non-driving duties.

*Top Proposed Strategy: Analyze truck driver compensation relative to other competing employment sectors.*

4. Detention / Delay at customer facilities: Delays have externalities such as driver's capability to comply with HOS rules and decreased earnings.

*Top Proposed Strategy: Research impacts and safety of customer detention on truck drivers and trucking operations.*

5. Truck Parking: Lack of truck parking

*Top Proposed Strategy: Identify strategic locations for new or expanded truck*

*parking.*

6. Driver Retention: Levels of turnover rate among drivers have decreased but remain a concern. Decreasing levels are believed to be a result of increased wages.

*Top Proposed Strategy: Research and determine retention strategies based on driver feedback.*

7. ELD mandate: Following the mandate, fleets need to transition from automatic on-board recording devices (AOBRDs) to ELDs. This concern has decreased since it has been implemented.

*Top Proposed Strategy: Research impact of ELDs on industry safety and productivity.*

8. Compliance, Safety, Accountability (CSA): It is unsure how CSA will perform under the IRT.

*Top Proposed Strategy: Advocate FMCSA to expand list of crash types.*

9. Transportation Infrastructure / Congestion / Funding: Vehicles cause wear and tear on roads, which lead to increased maintenance costs on vehicles and negative industry productivity.

*Top Proposed Strategy: Continue to advocate for long-term highway funding through a fuel tax or other user fees.*

10. Economy: Less freight is expected due to the trade wars with China. Industry is also awaiting the ratification of the United States-Mexico-Canada (USMCA) agreement.

*Top Proposed Strategy: Advocate for repealing regulation that negatively impacts industry costs.*

## **E-Commerce Impacts on the Trucking Industry**

E-Commerce has increased the demand for efficient supply chains, truck drivers, and infrastructure. As a result of these demands, equipment and technology are emerging in order to accommodate operations and the shorter delivery windows and faster turnaround times. E-commerce also brings attention to reverse logistics, where companies account for returned goods. Truck trips are becoming short intra-regional and local instead of inter-regional and national hauls. The top industry issues identified in a 2018 survey are ranked in the following order: driver shortage, Hours-of-Service (HOS), driver retention, Electronic Logging Device (ELD) mandate, truck parking, compliance/safety/accountability (CSA), driver distraction, transportation infrastructure/congestion/funding, driver health/wellness, and economy. It is critical for the trucking industry to remain agile and continue to adapt to the evolving markets as a result of e-commerce.<sup>33</sup>

## **Five Ways Telematics Solutions are Transforming Trucking**

Telematics are providing more data that can be analyzed to “improve efficiency, productivity, customer service, and profitability.” Telematics-driven software is collecting data for the following improvements:

1. **Asset Tracking:** Improves route efficiency.
2. **Maintenance management:** Informs driver of required maintenance such as fuel level, Diesel Exhaust Fluid (DEF) level, operating status, vehicle health, and mileage.
3. **Monitor Driver Behavior:** Fleet managers can assess driver safety through metrics such as speed, harsh braking or acceleration, seatbelt usage, tailgating, and cornering problems.
4. **Maximize Uptime:** Detected errors allow for informed and immediate decisions, which result in savings.
5. **Compliance:** the use of electronic logging devices (ELDs) assist drivers stay compliant with regulations.

## **Northern California-Based Union Carrier to Cease Operations After 48 Years**

After 48 years of operation, Rodgers Trucking will cease operations due to the rising business costs in California. As a result of the business closing, roughly 130 unionized truck drivers will be searching for employment. Financial challenges as a union carrier competing against low-cost nonunion companies were also a contributing factor for the company to cease operations. Smaller freight companies are faced with rising costs due to regulations and insurance. Southern Glazers Wine and Spirits (SGWS) was one of Rodgers Trucking major customers who will now provide their own transportation services.<sup>34</sup>

## **GOVERNMENT REPORTS**

### **Federal Agencies Should Take Additional Steps to Prepare for Potential Workforce Effects**

The U.S GAO office conducted a study to contribute toward the development of regulations that influence the implementation of automated vehicle technology. While technological advances have been made to launch self-driving trucks, stakeholders do not expect self-driving trucks to enter the commercial market within the next decades. Despite these efforts, opposition to self-driving trucks may present obstacles to public acceptance. The study concludes that self-driving technology will be significant for industry safety and efficiency; however, there is ambiguity as to how self-driving vehicles will impact wages, employment, and needed skills. Stakeholder opinions are divided as some perceive self-driving trucks will be implemented for long-haul trucking jobs, while others perceive trucks

will always require a driver. To minimize a skills gap as a result of emerging technology, federal agencies can provide development assistance to truck drivers.

There are four recommendations for the DOL and DOT: 1) the Secretary of labor should collaborate with the Secretary of Transportation to continue gathering information from stakeholders to be informed of potential workforce changes and analyze needed skills; 2) the Secretary of Transportation should collaborate with the Secretary of Labor to be informed of potential workforce changes and analyze needed skills, 3) The Secretary of Transportation should consult with the Secretary of Labor to analyze externalities as a result of automated trucking technology such as required hours needed to obtain a commercial driver's license.<sup>35</sup>

### **Entry-Level Commercial Motor Vehicle Operators Compliance Extension**

In 2016, the Federal Motor Carrier Safety Administration (FMCSA) amended the regulation "Minimum Training Requirements for Entry-Level Commercial Motor Vehicle Operators." The regulation established training standards for certain individuals applying for their commercial driver's license (CDL) for the first time. Such individuals must complete the entry-level driver training (ELDT) requirements and "complete a prescribed program of instruction provided by an entity that is listed on FMCSA's Training Provider Registry (TPR)."<sup>36</sup> Certification information will be sent to State Driver Licensing Agencies (SDLA) who may administer CDL skills tests to eligible participants. It was recently ruled that the compliance date for the Entry-Level Driver Training would be extended from February 7, 2020 to February 7, 2022 so that FMCSA can complete the development of the Training Provider Registry (TPR), which allows training providers to prove their ability to meet training requirements. FMCSA is extending the entire implementation rather than delay the phases that were initially introduced. This is due to unforeseen circumstances that were overlooked at the time the proposed rule was published.<sup>37</sup>

### **DoT Aims to Lower Barriers to Autonomous Tech for Trucks and Cars**

The DOT ruled to remove "unnecessary regulatory barriers to the safe introduction of automated driving systems" on vehicles operating in the U.S. In order to gain a broader prospective of the various risks associated with automated vehicles and address them with regulatory actions, the FMCSA is encouraging public comments. The lack of codified descriptive terminology creates ambiguity in discussions and dialogue. The FMCSA raises the following issues for public comment:

- CDL endorsements
- Requirements of human drivers
- HOS rules
- Medical qualifications
- Distracted driving

- Safe driving
- Inspection
- Repair
- Maintenance
- Roadside inspections
- Cybersecurity<sup>38</sup>

### **Is the U.S. Labor Market for Truck Drivers Broken?**

This study aims to understand the labor market for truck drivers. The American Trucking Associations (ATA) continually states the market is facing a truck driver shortage. A shortage is when the market is operating at a disequilibrium. BLS economist Kristen Monaco explains these fluctuations of market forces are normal from time to time and eventually attain equilibrium; however, it is not normal for a market to remain at disequilibrium for over a decade. The labor market is influenced by wages; high wages attract more individuals to the market and low wages discourage individuals from entering the market. A shortage can be alleviated in the short run by increasing wages and alleviated in the long run by developing a new supply in response to higher wages.

Using publicly available data from U.S government agencies, employment earnings and occupational mobility metrics were collected. The data indicated the market had been tight from 2013 through 2017, meaning wages were strong relative to the number of those in similar occupations, and employment numbers have been robust. Normal labor market behavior is also detected, with truck drivers entering or exiting the market shifting to other occupations that require similar human capital skills. In addition, the quantity of labor supplied responds in accordance to change in wages. This portrays that the truck driver market responds to incentives as any other blue-collar occupation. Although it may be tight, there are no constraints to enter or exit the market that may prevent supply from responding to changes in wage.<sup>39</sup>

Monaco's research aligns with studies developed by the Owner-Operator Independent Drivers Association (OOIDA). OOIDA's research show a decrease for drivers at large carriers and observes a shift for truck drivers to become owner-operators or join smaller fleets.<sup>40</sup>



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## VIII. ABBREVIATIONS AND ACRONYMS

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ADAS	Advanced Driver-Assistance Systems
AOBRD	Automatic On-Board Recording Device
ATA	American Trucking Associations
ATRI	American Transportation Research Institute
BIT	Basic Inspection of Terminals
BLS	Bureau of Labor Statistics
CAAP	California Air Action Plan
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CDL	Commercial Driver's License
DTSC	Department of Toxic Substances Control
ELD	Electronic Logging Device
EPA	Environment Protection Agency
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FTL/TL	Full Truckload/Truckload
GAO	Government Accountability Office
HOS	Hours of Service
HTA	Highway Traffic Act
IRT	Item Response Theory
JIT	Just in Time
LIDAR	Light Detection and Ranging
LTL	Less-than-Truckload
OEM	Original Equipment Manufacturer
O-O	Owner Operator
OOIDA	Owner-Operator Independent Drivers Association
OSHA	Occupational Safety and health Administration
OTR	Over The Road
SB1	Senate Bill 1
SWRCB	State Waters Resource Control Board
TSA	Transportation Safety Administration
UIIA	Uniform Intermodal Interchange and Facilities Access Agreement

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