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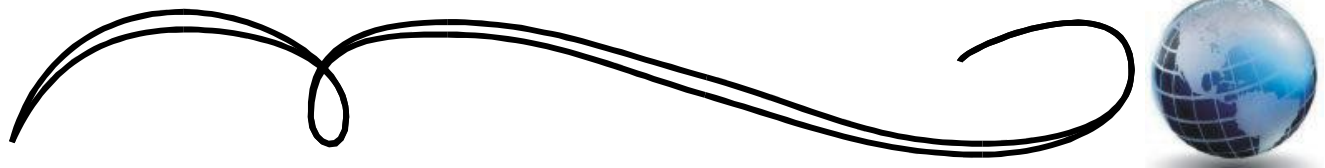
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7 The New E-Commerce / Home Delivery Retail Distribution Paradigm

Henry E. Seaton

27 In-Transit Cargo Crime Impacting the Retail Supply Chain

John Tabor

35 About Item Response Theory Models And How They Work

Nell Sedransk

45 Rail – The Left-Out Service Alternative

Charles W. Clowdis

49 Precluding Discovery of Preventability Determinations In Trucking Accidents

Patrick E. Foppe

53 Safety Fitness Determinations: What Is FMCSA Measuring?: Big Data And Regulatory “Improv” Are Drowning Due Process

Mark J. Andrews and Henry E. Seaton



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Editorial Policy

The primary purpose of the JTM is to publish managerial and policy articles that are relevant to academics, policymakers, and practitioners in the transportation, logistics and supply chain fields. Acceptable articles could include conceptual, theoretical, legal, case, and applied research that contributes to better understanding and management of transportation and logistics. Saying that, our policy requires that articles be of interest to both academics and practitioners, and that they specifically address the managerial or policy implications of the subject matter. Articles that are strictly theoretical in nature, with no direct application to transportation and logistics activities, or to related policy matters, would be inappropriate for the *JTM*. Articles related to any and all types of organizations, and of local to global scope, will be considered for publication.

Acceptable topics for submission include, but are not limited to, broad logistics topics, logistics and transportation related legal issues, carrier management, shipper management of transportation functions, modal and intermodal transportation, international transportation issues, transportation safety, marketing of transportation services, transportation operations, domestic and international transportation policy, transportation economics, customer service, and the changing technology of transportation. Articles from related areas, such as third party logistics, purchasing and materials management, and supply chain management, are acceptable as long as they are related to transportation and logistics activities.

Submissions from practitioners, attorneys or policymakers, co-authoring with academicians, are particularly encouraged in order to increase the interaction between groups. Authors considering the submission of an article to the *JTM* are encouraged to contact the editor for help in determining relevance of the topic and material.

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Manuscripts. Submit manuscripts to the editor by email attachment at taylorjohn@wayne.edu. Manuscripts should be no longer than 30 double-spaced pages and 7000 words. Guidelines for manuscript submission and publication can be found in the back of this issue.

Subscriptions. The Journal of Transportation Management is published twice yearly. The current annual subscription rate is \$50 domestic and \$65 international in U.S. currency. Payments are to be sent to Laura Plizka, Delta Nu Alpha, 1720 Manistique Avenue, South Milwaukee WI 53172.

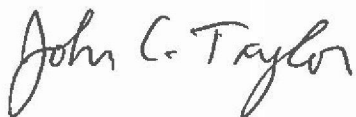
From the Editor...

Welcome to the Summer/Fall 2018 issue of the Journal of Transportation Management (JTM), being Vol. 29 No 1! This issue of the Journal is dedicated to legal issues in primarily the trucking industry. The issue starts with an article on legal issues in E-Commerce trucking, includes a second article on in-transit cargo crime impacting the retail supply chain, moves to an article on item response theory models and how well they work with FMCSA data, goes to a fourth article on rail related alternatives, has a fifth article on discovery issues related to trucking accidents, and concludes with a reprinted article, from a recent JTM issue, on what FMCSA is measuring with safety fitness determinations and the impact on due process.

Our first article examines legal issues in trucking, related to home delivery in retail distribution. A number of unresolved issues related to home delivery contracting, regulatory, and risk transfer issues involving selection and retention of carriers are explored. The second article is on in-transit cargo crime impacting the retail supply chain. The authors explore the extent of the problem and offer a number of suggestions for preventing in-transit crime. The third manuscript explores item response theory models and how well they work with FMCSA data. The article concludes that IRT models have the potential to provide a stable and fair scoring system. Whether it can achieve this goal will depend on the availability of accurate relevant data on all the important aspects of "Safety Culture." The fourth article examines the potential for rail services. The article postulates that rail may be a viable alternative for a growing number of commodities, and specifically examines the viability of rail services for the wine industry. The fifth article looks at discovery issues related to trucking accidents. The article suggests that trucking company's efforts to preclude discovery or admission of preventability determinations in a lawsuit are bolstered by FMCSA statements. The sixth article, reprinted from a recent issue of JTM, is a law review style piece that looks at what the FMCSA is really measuring with its use of big data in safety fitness determinations, and the impact on due process. The author suggests that the successive efforts of FMCSA and its predecessor agencies to measure safety and fitness based on mass quantities of roadside inspection data are incapable of either accuracy or fairness.

At the *Journal*, we are continuing to make a number of changes that will improve the visibility of JTM, and improve its position in the supply chain publishing world. These include registering and updating journal information with several publishing guides, and placing the past and current content on services that provide visibility to Google Scholar. Authors will receive summaries of downloaded articles monthly, and can examine the Digital Commons web site for data on various aspects of the publication and their articles. One year old issues will be placed into the system.

I look forward to hearing from you our readers with questions, comments and article submissions. The submission guidelines are included at the end of this issue's articles and I encourage both academics and practitioners to consider submitting an article to the Journal. Also included in this issue is a subscription form and I hope you or your library will subscribe.



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THE NEW E-COMMERCE / HOME DELIVERY RETAIL DISTRIBUTION PARADIGM

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ABSTRACT

The purpose of this article is to set forth a basic outline of the new e-commerce home delivery retail distribution paradigm. Special attention will be placed on how it is being implemented and the as yet

unresolved contracting, regulatory and risk transfer issues involving selection, retention, and use of motor carriers, particularly for the rapidly developing final delivery of consumer goods.

PART I: THE TRADITIONAL RETAIL DISTRIBUTION MODEL

Traditionally, most retailers used inbound truckload shipments from suppliers to regional and district distribution centers (first mile). From distribution warehouses, these retailers serviced their stores using private or dedicated carriers for stop-off truckload or pedal run deliveries based upon store inventory needs. This traditional model has been augmented by hot shot or expedited shipments of urgently needed out-of-stock items or by using integrated LTL carriers and/or parcel delivery providers like USPS, UPS and FedEx for store or consumer deliveries. As a distinct and separate model, local delivery services, couriers and private carriage has been used to make deliveries from stores, restaurants and grocers of locally sourced goods.

Because of economic regulation, there was a limited choice of carriers and little or no competition for rates and service levels. Transit times were designed to suit the needs of limited “regular route” certificate holders with high fixed costs. Retail distribution involved first mile inbound logistics, pooled shipments to LTL carrier-owned break bulk termination locations for deconsolidation into LTL shipments distributed over a network of cartage agents and authorized short haul carriers.

Before deregulation and the popularity of big box retailers and mega malls, Sears & Roebuck, Montgomery Ward and others offered catalogue sales which avoided in-store inventory costs by drop-shipping ordered items to rural consignment facilities for customer pickup and payment. With the advent of deregulation, price competition was introduced. Flexible truckload and stop-off truckload service providers altered the traditional model. This led to the demise of many regular route commodity carriers whose unionized labor costs were non-competitive.¹

The New Old Fashioned Way

There is some irony in the fact that three decades later, the new retail paradigm is a “new old-fashioned way” utilizing retailer controlled inbound truckload, pooled outbound, and less-than-truckload or parcel delivery final mile delivery with important distinctions. Make no mistake, from a distribution point of view, increased competition and choice created by e-commerce, more efficient inventory control and quicker and more flexible deliveries all mandate a radical reevaluation of inventory control and management that the new paradigm permits. Yet, the model is not the same across all retailers, regardless of commodity or weight. The “cheese has been moved” and e-commerce with expedited final mile home delivery is no fad.² Yet this article will examine latent issues with the new paradigm which questions the sustainability of the “free freight and free return” concept.

The new paradigm increases not only the need for final mile delivery services, it is driving investment and speculation in new retail warehouses that "... can sort packages closer to urban consumers and deliver them more rapidly."³

Factors Creating the New Retail Distribution Paradigm

A number of concomitant factors have led to a reexamination of the traditional retail distribution model. They include: (1) internet sales have offered consumers increased choice and cost competition; (2) technological advances and shipment tracking has permitted quicker, more dependable delivery times which reduce inventory and store stocking needs; and (3) productivity issues with truckload and stop-off truckload deliveries caused by the ELD mandate and the hours of service strictures have resulted in scheduling and detention problems that have made the traditional truckload and stop-off truckload paradigm less responsive.

The new paradigm offers the ultimate consumer the convenience of comparison shopping on multiple websites for durable goods with the promise of "free freight and free returns" when the final delivery and return cost can be absorbed in the retailer's margin or offered as a loss leader to increase market share and foster website loyalty.

As a result, many established retailers are following their customers' buying preferences for internet purchases and home delivery by developing hybrid models using the new paradigm to reduce inventories and direct sales expenses.

Commentators suggest that traditional department stores, grocery chains and big box retailers and specialty chains are all moving to offer e-commerce and home delivery as a complement if not a replacement for in-store sales.⁴

What are the Segments of the New Paradigm?

The new paradigm has variations based upon the retailer's product line, the size of its shipments and whether inside home delivery and installation is required. Yet regardless of these variables, the

traditional inbound and outbound logistics model is being irrevocably altered.

(a) First Mile

Previous inbound logistics involved truckload movements from suppliers to multiple separately-stocked, retail, distribution warehouses for storage and store replenishment. Under the new model, inbound logistics is typically coordinated through a handful of fulfillment centers with upstream pressure on suppliers for tighter and more expedited delivery times (inbound or first mile leg).

These up-supply chain demands, particularly in the grocery and wholesale big box segments, have resulted in penalties for late deliveries, rescheduling fees, waiver of mitigation and unreimbursed detention fees which continue to present challenges for suppliers and the inbound truckload carriers which serve them.⁵ Exacerbating the supplier and carrier predicament is ELD enforcement of hours of service, contractual waiver of Carmack in the name of the Food Safety Modernization Act, and the enforcement of tightly scheduled delivery appointments which can be coercive and inconsistent with reasonable dispatch.⁶

In some instances, retailers have pushed home delivery responsibility upstream to the suppliers, paying only for deliveries accepted by the consumer. This practice has led to free astray issues, which many suppliers or manufacturers are ill-prepared to handle. (See "Free Returns" p. 1.)

(b) Middle Mile

Under the new paradigm, technology is used to rapidly sort and segregate thousands of SKUs (or Stock Keeping Units) at fulfillment centers, down to the individual item (including its size and color) for ultimate consignment to retail stores or for direct customer delivery. So-called "middle mile" is the term for the use of regularly timed, consolidated shipments from fulfillment centers to break up or cross-dock locations for final mile delivery.

This important middle mile portion is typically controlled by the shipper through private carriage, or under contract with truckload carriers or through brokers. Frequently, dedicated pools of trailers either owned by the shippers or third parties are used. Trailer pools allow loading efficiency, avoid loading and unloading delays and decreases wasted drive time. Contracting issues involved include the use of necessary trailer interchange agreements, trailer tracking and recovery issues, the need for physical damage insurance, and seals and SLC (Shipper Load and Count) issues.

Middle mile pool service, unlike just-in-time (or JIT) deliveries to automobile assembly plants is particularly subject to seasonal customer-driven spikes. The Christmas “rush” can spike first mile and middle mile costs to obtain excess capacity, particularly when the customer expects same or next day delivery.

(c) Final Mile

The biggest change in the new paradigm and the source of the greatest confusion and controversy is the “final mile” segment. Depending upon the nature of the retailer and the product mix, after deconsolidation “final mile” deliveries are made for store replenishment, to stores for customer pickup of ordered items or for direct home or job site delivery to customers.

Under the new paradigm, small packages consigned for home delivery may be tendered to the post office (USPS) for mailbox deliveries. Consolidated or larger shipments including home delivery of furniture and appliances are typically tendered to operators of straight trucks weighing more than 10,001 pounds. Yet, much of the “final mile” home delivery service is now being provided in sprinters or cargo vans weighing less than 10,001 pounds (hereinafter referred to as Small Delivery Vehicles or SDVs). It is this new element of the e-commerce/home delivery model which creates the greatest confusion and problems.

Variations of the New Paradigm

It is beyond the scope of this article to describe the model permutations most useful for specialty retailers but some examples of the variant models should be informative:

(a) E-Commerce Retailers

The so-called Amazon model began as primarily a pure e-commerce alternative to local brick and mortar retailers. “Mr. Bezos (Amazon’s founder) saw that quick delivery could change how people buy things. Price and selection have always been important in retail but delivery would surpass store location as another critical factor.” Amazon now has over 110 fulfillment centers in North American and is setting up warehouses in major cities to provide for same-day or one-day service of more products.

Amazon “... keeps working to add faster and even more convenient delivery options” becoming an expedited distribution company in competition with FedEx and UPS, providing not only a product sales platform with distribution and final mile delivery, but transportation services utilizing its own equipment for products not marketed through its website.”⁷

In this context, Amazon is rapidly expanding its e-commerce home delivery niche, pushing its own delivery service in competition with FedEx and UPS.⁸ With its acquisition of Whole Foods and local warehousing it evidences its intent to invade the grocery store delivery market previously provided by private retailers or local delivery services without much structure. It has become the retailing behemoth whose size and seemingly unlimited resources is allowing it to develop retail stores and to get manufactured and market its own proprietary products. As traditional retailers move to increase online sales, e-commerce retailers are moving to establish permanent store locations to attract new customers. Online retailers are predicted to open at least 850 stores in the next four years.⁹

Amazon’s size and seemingly unlimited resources are allowing it to develop retail stores and to

FIGURE 1
PERCENTAGES OF U.S. RETAIL E-COMMERCE SALES

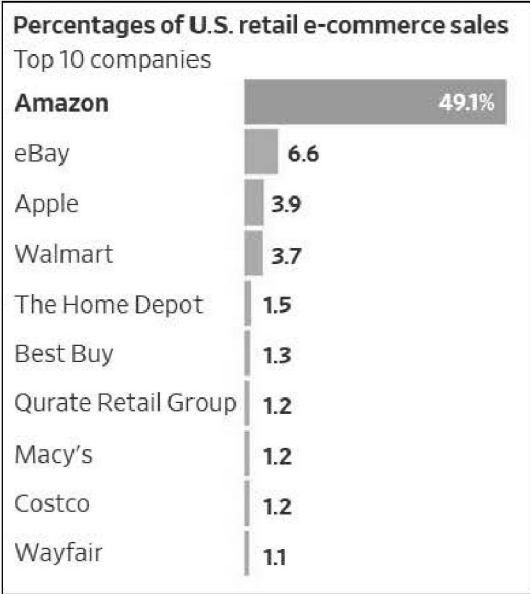
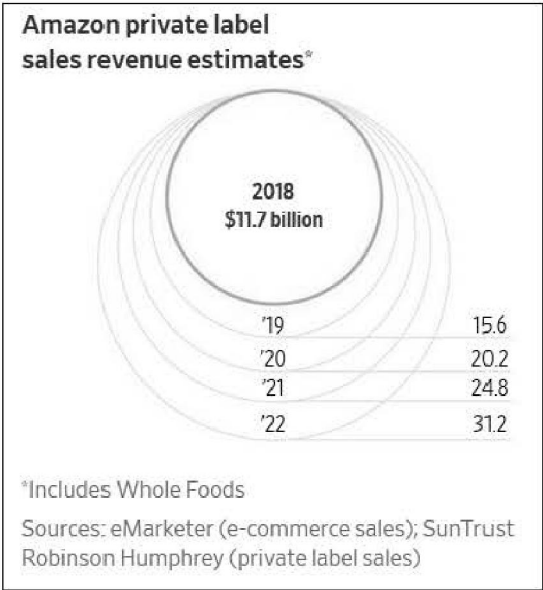


FIGURE 2
AMAZON PRIVATE LABEL SALES REVENUE ESTIMATES



produce and market proprietary items such as books.¹⁰ Its e-commerce market share already totals approximately 50% of the total and private label sales are projected to increase as the following charts show in Figures 1 and 2:

(b) Department Stores

“To remain competitive for the ever-increasing expedited home delivery model, department stores are not only expanding their online website offerings, they are changing their store delivery models in an attempt to play offense,” Marc Lore who runs Walmart’s U.S. e-commerce, says.¹¹ These traditional retailers are trying to leverage their physical stores as a way for people to order online and make drive-by pickups as well as order non-stocked items requiring assembly for expedited focused delivery using the new fulfillment model.

E-commerce offers with a variety of color, style and size options to apparel consumers not available at a typical department store or shopping center boutique. With store inventories shifting and in-store fitting options, the new paradigm, like the old Sears and Montgomery Ward catalog stores, can bring customer ordered product to smaller footprint retail locations for customer pickup without excessive in-store inventorying. Online retailing with email advertising has become an effective marketing tool for chain retailers which can reduce marketing costs with easy to adjust promotional in-season sales to avoid overstocks.

“Many retailers with stores also touted a buy-online, pickup in store option available throughout Christmas Eve to fulfill last minute gift needs. Overall, sales in that category grew 47% from November to December 19 according to Adobe.”¹² Online sales and pickups are credited by Walmart for increasing customer visits and per store revenue in the last quarter.¹³

(c) Hybrid Models

Grocery chains and shopping club warehouses have adopted portions of the new paradigm to reduce costs, compete with internet sales and the home

delivery/final mile model. With the exception of mail order specialty items, grocers selling perishable commodities are typically serviced from locally stocked in-store inventories. Urban delivery services of groceries and fast food from store inventories is nothing new, nor an issue which has been subject to federal or state regulation.

Like Uber and Lyft services, final mile grocery and food order deliveries have traditionally been provided by part-time contractors in their own vehicles without addressing the federal and state labor overtime and worker’s compensation issues. The proliferation of class action suits alleging misclassification of similarly situated contractors has a spill-over effect from issues being litigated in the “big truck” arena, suggesting possible unforeseeable future risks.

Clearly, the attractiveness of the in-store shopping experience, bulk pricing discounts and special promotional sales campaigns attest to the continued viability of the multi-item warehouse store that mixes bulk sale of grocery items with a vast array of consumer goods. Yet a recent survey by the Food Manufacturers Association notes that 77% of shoppers are price driven. This competition on prices has obviously put pressure on the suppliers and first mile inbound logistics. At the same time, consumers covet the convenience of home delivery of groceries and meals ready to eat.¹⁴ As a result, grocery chains and shopper clubs are offering home delivery of locally stocked goods and where relevant, home delivery of vendor or fulfillment centered stocked electronics and more expensive durable products.

Fierce price competition has been reported as causing wholesale grocers and warehouse retailers to squeeze suppliers and trucking companies to offer more for less.¹⁵

(d) Hardware and Construction Supplies

Big box home and garden retailers offer a plethora of choices and convenience for handymen and professional contractors. E-commerce is viewed as

complementing, not replacing in-store sales. These retailers can have as many as 200,000 different SKUs (Stock Keeping Units) ranging from multiple size bolts and screws to building supplies, lawnmowers, seasonal furniture and plant material. Construction projects may require scheduled job site deliveries with flatbed and forklift service.

Yet, the fulfillment center/e-commerce model allows a full array of SKUs to be advertised without inventorying slow moving or seasonal campaign material at every store. More centralized national purchasing and replenishment can reduce inventory costs. By using technology, interim distribution warehousing can be reduced to half a dozen or more fulfillment centers nationwide from which outbound pools can deliver specialty orders either to final mile providers for direct to customer delivery or to nearby stores for customer pickup. This fulfillment model, retailers claim, can offer one or two day delivery to as many as 90% of the population. Even with the redundancy of the final mile portion (be it in an SDV, straight box truck or flatbed), this model can allow for better inventory control, flexibility and customer satisfaction.

(e) New Furniture and Appliances

This retail segment has been under significant distribution changes since deregulation. Traditionally, case goods and upholstered furniture were among the most prized and expensive retail purchases. Yet new furniture is no longer considered a family heirloom. Production has been moved overseas. Comparative costs have dropped. Large showroom retailers with their own private fleets have emerged. Most new furniture is manufactured and boxed overseas and brought onshore for home delivery as well as in-store sales.

In-home delivery of new furniture and the installation of appliances and some electronics create specialized last mile service needs, including straight trucks (CMVs weighing more than 10,001 pounds gvw). Drivers may need helpers and assembly or installation expertise. As a result, this niche requires special handling and home delivery is now provided

by established furniture specialists and by large truckload and LTL carriers which are expanding into the field.

In-home delivery creates the possibility of different tort related claims and insurance issues. Driver background checks and commercial general insurance for non-auto related personal injury and property damage liability is important. Home delivery of furniture and appliances typically requires expertise and special handling which creates a niche service with its own challenges. In addition to traditional furniture haulers, major truckload and LTL carriers are seeking to enter this area with expanded service for their core shippers.¹⁶

Lower Distribution and Transportation Costs is the Key

The goal of various e-commerce models is for the retailer to reduce its freight-on-board (FOB) delivered price while protecting or increasing its margin. Ultimately, the new distribution paradigm is a model which must be fine tuned. Retailers are attempting to reduce inbound first mile logistics costs by increasing demands for narrow expedited delivery windows on truckload shipments with penalties for late deliveries and no detention.

In the middle mile segment, expedited pool deliveries can be facilitated by avoiding live loading and using shipper-controlled trailer pools. Yet small carriers accepting “power only” moves complain being stranded at destination” with no alternative but to accept a noncompensatory return load to get back home. Otherwise, the transportation costs on these two legs are based on backhaul capacity and the limitations of federal safety regulation governing Hours of Service applicable to operators of straight trucks and semis.

For both first and middle mile segments, the use and survival of the independent contractor model offers a competitive cost advantage and encourages productivity.

The Importance of the Independent Contractor Model on Cost Reduction

Retailers in fierce price competition have typically avoided the expense of increased labor cost and liability of private carriage with company drivers. Since deregulation they have, to a great extent, used licensed, authorized and insured carriers which in turn retain owner-operators to provide flexible truckload and stop-off truckload services. The owner-operator model which utilizes “independent contractors” which lease equipment with drivers to carriers is supported by the so-called truth-in-leasing regulations. It provides a roadmap for how carriers should treat independent contractors which operate in interstate commerce. *See* 49 C.F.R. 376.

Also, there is a traditional federal control test applicable to interstate carriers that has been used to justify favorable small business tax treatment of blue collar entrepreneurs who own equipment and provide it with drivers to carriers. An estimated 800,000 small businessmen follow this model. Numerous states have recognized exemptions from state law employment treatment for owner-operators which comply with the federal leasing regulations and/or meet the 20 part federal control test. Yet, the independent contractor model is under great pressure under various state laws for alleged “misclassification.” That is the argument that the owner-operator model somehow unjustly deprives the working man of employee benefits such as unemployment compensation, worker’s compensation and other welfare benefits.

E-commerce retailers led by Amazon are attempting to hire third party delivery companies called “Independent Service Providers” or “ISPs” to provide final mile deliveries.¹⁷ Under this model, the ISP accepts the liability for compliance with all federal and state safety, insurance and employment laws, shielding the retailer from up-supply chain exposure and acting as independently contracted carriers, in turn hire owner-operators as subcontractors who are paid based on the work performed, not by truckload.

The premise of hiring an ISP and shifting the compliance burden to qualified independent contractors is a practical model, particularly when the ISP can be vetted as a carrier under federal regulatory standards and has appropriate insurance. Yet systems must be in place to assure the retailer that it can be properly indemnified and held harmless from up-supply chain so-called “vicarious liability” and that it will not otherwise be held liable for negligent selection or co-employment status.

PART II UNRESOLVED ISSUES WITH FINAL MILE DELIVERIES CREATE SIGNIFICANT ISSUES WHICH AFFECT THE EFFICACY OF THE NEW PARADIGM

FedEx, UPS and other established carriers with home delivery networks remain, and USPS provides significant last mile home delivery through zone skip mini pools delivered to mail centers for home delivery at volume rates. But the postal service is reexamining its discounted rate structure and increases are expected.¹⁸

In order to fully develop the new paradigm and compete on cost, offering “free freight and free returns” many retailers are being driven to set up and control their own less costly e-commerce delivery systems. With established first and middle mile transportation service providers readily monitored and subject to federal motor carrier safety regulations, it is the final mile piece that poses the greatest risk and challenges.

As a result, e-commerce retailers are encouraging new entrants to enter the home delivery market as independent service providers with not only straight trucks but non-commercial motor vehicles such as cargo vans, sprinters, pickups, and passenger vehicles (hereinafter referred to as “Small Delivery Vehicles” or “SDVs”)

Vicarious Liability and the Vetting of Last Mile SDV Operators

By far the biggest issue in the selection and use of transportation service providers is the possible vicarious up-chain liability arising out of property damage and personal injury caused by the carrier. Under the commerce clause and the doctrine of preemption, federal law can trump state law in the name of uniformity with preemptive effect. Preemption can be so-called field preemption, implied by statute when the intent of Congress is evidence that state law shall have no effect, or expressly stated in a statute.

For the past 15 years, beginning with *Schramm v. Foster*, 341 F. Supp. 2d 536 (D. Md. 2004), the major issue facing the trucking industry has been the application of federal safety rules and their effect in exacerbating shipper and broker liability for accidents.

With respect to commercial motor vehicles weighing 10,001 pounds gvw or greater (called a “Commercial Motor Vehicle” or “CMV”), it is clear the Federal Government has exercised preemptive effect and has established not only Federal Motor Carrier Safety Rules but also assigned the job of determining whether carriers are safe to operate on the nation’s roadways to first, the ICC and then the Federal Motor Carrier Safety Administration.

While there has been much litigation over what vetting duties and obligations a shipper or broker must have in the carrier selection process, the FMCSA is charged only with determining that interstate operators of commercial motor vehicles

are “safe to operate on the nation’s roadways.” See 49 U.S.C. 31144. These federal vetting requirements do not apply to operators of small delivery vehicles (SDVs) weighing less than 10,000 pounds.

On the one hand, major retailers expect final mile delivery service to meet federal insurance requirements applicable to larger trucks and comply with all federal and state laws including the standards set forth in the Federal Motor Carrier Safety Regulations. The following chart in Table 1 shows that there is no uniformity or consistency in the application of federal safety regulations to the transportation of interstate shipments based on the size of the vehicle used. In fact, SDVs weighing less than 10,001 pounds gvw are not subject to federal safety regulation with few exceptions. The equipment is not required to be placarded with the name of the owner. The drivers are not required to have driver qualification files. The equipment does not have to pass periodical maintenance and inspection standards, and importantly, there are no hours of service requirements to preclude fatigued driving.

Although Federal Motor Carrier Safety Regulations including hours of service do not apply to vehicles weighing less than 10,001 pounds gvw, whether SDV providers are handling interstate or intrastate freight otherwise can make important differences. The Truth-in-Leasing regulations applicable to owner-operators (49 C.F.R. Part 376) and cargo claims rules and statutes apply (49 U.S.C. 14706,

TABLE 1
FEDERAL MOTOR CARRIER REGULATIONS BY TRUCK TUPE AND GVV

Truckload	Straight Truck	Small Delivery Vehicles
> 26,000	> 10,001	< 10,001
FMCSR regs apply	FMCSR regs apply	No safety/non-CMV
\$750,000 BI&PD	\$750,000 BI&PD	\$300,000 BI&PD
49 CFR §376	49 CFR §376	49 CFR §376
HOS apply	HOS apply	HOS does not apply
		No placard

49 C.F.R. Part 370) to the SDV drivers handling these interstate shipments. Additionally, SDV operators in interstate must have a minimum of \$300,000 insurance limits applicable to all equipment (49 C.F.R. 387.303).

FMCSA certification that an operator of a CMV in interstate commerce is fit to operate on the nation's roadways provides a simple vetting standard for operators using straight trucks and semis in interstate commerce. Evidence that a carrier has been vetted by the FMCSA and is properly licensed, authorized, and insured is the vetting standard customarily used by shippers and brokers. It offers the best defense against lawsuits based on state law causes of action such as negligent selection and negligent entrustment.

Yet with respect to operations of SDVs, the absence of federal preemptive fitness determination standards and enforced safety requirement creates confusion, vetting problems and the opportunity for the application of diverse and inconsistent state laws. This makes the qualification and use of SDV delivery services, and new entrants, in particular, a more difficult and risky proposition.

The following Federal qualification standards to not apply to SDV operators in interstate commerce: (1) driver qualification and background checks; (2) random drug and alcohol tests; (3) equipment, maintenance and repair standards; (4) enforcement of hours of service requirements to prevent fatigued driving; and (5) recordkeeping requirements. New entrants are required to pass a new entrant audit and a carrier loses its right to operate if its liability insurance is canceled. Commercial motor vehicles must bear the name of the licensed carrier and its docket number. Under the MCSAP program, the states are paid millions of dollars annually to inspect commercial motor vehicles in accordance with standards the FMCSA sets and to log carrier violations into a database for the agency to use as an enforcement tool leading to a possible safety audit and termination of the carrier's right to operate. None of these safety requirements or carrier vetting standards apply to use of SDVs. See 49 C.F.R. 386 *ff*.

So how does a shipper or broker vet an SDV carrier if the federal safety regulations do not apply and the SDV operator has not been certified by the FMCSA as safe to operate on the nation's roadways?

The different final mile contracts being circulated by retailers and their brokers belie any consistency or consensus. Many SDV shipper contracts track their interstate contract for operators of straight trucks and semis, ignoring both the intrastate v. interstate and the noncommercial motor vehicle issues discussed herein. These contracts typically include contractual requirements of compliance without treating the unique SDV issues discussed.

Some retailers, who appear to have no corporate expertise in transportation, apparently conclude that the legal issues are beyond them and attempt to hire third party logistics companies that will manage a suitable vetting program as they see fit and offer indemnity against up-supply chain liability including labor and safety issues if they fail to do so. The result of this approach is frequently contract terms which treat SDV providers as independent contractors under state law and which require up-supply chain indemnity. Insurance limits may be inserted, but independent vetting is costly and difficult to manage.

In some instances, a retailer or 3PL will insist that a third party contracting service historically involved in the courier industry review, vet and transmit payments to the SDV provider. These services, typically used to vet owner-operators for courier services, may offer information concerning state compliance issues and may assist with obtaining occupational accident insurance but do not indemnify the retailer or 3PL against misclassification or other employment and safety liabilities.

Finally, established 3PLs and motor carriers with final mile experience appear to be more sensitive to the SDV issue. So far, many have been able to hold off on their use of SDVs and limit their final mile offering to the straight trucks which are subject to

FMCSA safety regulations and use federal truth-in-leasing requirements for owner-operators.

Insurance Issues with SDVs

The typical risk transfer devices in shipper and broker contracts with motor carriers include broadly worded indemnity language and proof of applicable insurance to protect the customer from up-supply chain liability. Usual insurance requirements for carriers utilizing commercial motor vehicles is as follows:

- (1) Auto Liability (called BIPD) in the amount of \$1,000,000 per occurrence.
- (2) Commercial General or General Liability Insurance in a similar amount.
- (3) Cargo insurance in the minimum amount of \$100,000 per occurrence.
- (4) Worker's compensation as required by state law.

These requirements are often accompanied by a certificate of insurance and warranty of coverage. Unfortunately, obtaining and verifying similar coverage in these amounts for carriers using SDVs creates problems.

(1) Auto Liability

Federal insurance requirements applicable to CMVs operating in interstate commerce require a \$750,000 minimum with coverage endorsement (MCS-90), confirmed by a federal filing which assures a retailer that a qualified insurer will pay any third party property damage or personal injury claim up to that amount for which the carrier becomes legally liable. The advantage of the endorsement is it ultimately applies to any commercial motor vehicle used by the carrier and no further examination of the service provider's individual policy is required.

This is not so for SDV operators, few of whom make filings. In this context, a systemic problem in vetting carriers which provide hot shot services or interstate expedited delivery utilizing SDVs has been liability insurance verification. Without the substantial federal filing requirements, there is no assurance

from a certificate issued by an insurance agent (a COI) that the policy as written covers "any auto." Because non-CMV vehicles need not be placarded and the drivers are not required to be vetted, there are real issues determining whether the insurance is in place for subcontracted independent owner-operators.

In this context, although the risk of catastrophic loss is low, the premiums charged to SDV operators for \$1,000,000 million per occurrence auto liability is frequently at or above the big truck cost and can total \$18,000 per month – a major cost factor to be considered.

All too frequently, an SDV operator, assuming its same state operations are intrastate, will procure coverage meeting the state law minimums. This can be as little as \$24,000 per occurrence. SDV operators utilizing cars and pickups frequently do not have coverage which extend to commercial uses. The result can be major coverage gaps which create defaults in promised coverage which sprinter and van operators lack the resources to make up.

(2) Commercial General Insurance

This type of insurance covers personal injury and property damage caused by a carrier which is not related to auto liability. While this type of coverage is frequently waived in contracts with licensed and federally regulated truckers, it is more important for final mile delivery when in-home delivery, installation and personal injury to homeowners and their property are more likely to occur.

Tort claims against carriers regardless of the size of equipment used poses real problems when in-home deliveries are made. Carriers and brokers entering the final mile arena report increased property damage and personal injury claims including assault and battery with unanticipated liability and insurance cost results which warrants insisting that final mile carriers maintain commercial general insurance.

(3) Cargo Liability

Unless special accommodation is made, a home delivery “free freight and free return” offered to the e-commerce/home delivery buyer can create an exacerbated cargo claims handling problem. The last mile delivery company may be making doorstep drops and not be present when the package is opened. Allocation of concealed damages between first, middle and final mile is a seemingly impossible task. As a result, insurers are particularly unwilling to underwrite cargo for final mile deliverers without high deductibles. Moreover, cargo policies often include exclusions for theft; and the claims handling expenses for parcel deliveries can be cost prohibitive.

(4) Worker’s Compensation

A major labor law issue affecting the use of SDVs in final mile service is the application of state worker’s compensation laws. In most states commercial drivers, acting as true independent contractors who own and lease their equipment to authorized carriers under Part 376 leases can be classified as independent contractors involved in a separate trade or business, if not subject to excessive control by the carrier. Led by California and Massachusetts, there is a trend to change the so-called ABC Test for determining whether a driver is an employee or contractor for worker’s compensation purposes. Conflicting rulings on the preemptive effect of federal law in the 9th and 1st Circuits and the declination of the Supreme Court to decide the issue has left uniform treatment of inconsistent state laws in shambles. Potential greater exposure exists if final mile is deemed intrastate only and not otherwise affecting an SDV’s routes, rates or services.¹⁹

In this context is the FMCSA finding that federal law trumps the California meal and rest break rule as a matter of federal preemption has been challenged by the California Labor Commission in the 9th Circuit.²⁰ The federal preemption argument is harder to make for operators of SDVs which cannot claim federal hours of service rules and uniform FMCSA safety rules apply.

Contracting with owner-operators in 49 C.F.R. 376 compliant leases gives structure and favorable federal tax law treatment based upon previous IRS rulings and establishes a compliance template if strictly adhered to.

Misclassification exposure and up-supply chain liability for worker’s compensation can be a serious problem under state law for the customer who attempts to micromanage and control the operation of the SDV service provider which lacks the resources to make good on its contractual indemnity obligations. Retailers and brokers who retain operators of SDVs have been sued under “cut through” theories when SDV carriers were found to have failed to procure worker’s compensation under state law. (See *Collins v. Seko Charlotte*, Case No. 27519 (SC 04/29/15); *Young v. Act Fast Delivery of W. Virginia, Inc.*, No. 5:16-CV-09788, 2018 WL 279996 (S.D.W. Va. Jan. 3, 2018)).

Are Typical E-Commerce Deliveries Shipments Moving in Interstate Commerce

A major contracting issue involving final mile delivery between points in the same state, regardless of the size of equipment used, is whether a final mile delivery between points in the same state is an interstate shipment when it is pooled into the state for ultimate customer delivery.

This issue was addressed by the Interstate Commerce Commission in 1992 in an Administrative Ruling entitled “Policy Statement – Motor Carrier Interstate Transportation – From Out of State Through Warehouses to Points in the Same State, *Ex Parte* MC-207.” Therein, the Agency established guidelines to be used to determine if property “temporarily stored in a warehouse or distribution center before moving to its final destination” moves in interstate commerce rather than intrastate.

The Commission found: “The controlling element in determining whether traffic is interstate is if the shipper has a fixed or insistent intent to have the

shipment continue in interstate commerce to its ultimate destination.”

The Commission concluded that the presence or absence of any of the following factors did not constitute a break in the continuity of interstate commerce at the warehouse. Those factors included: (1) the shipper’s lack of knowledge of the ultimate destination or consignee at the time the shipment leaves; (2) whether separate bills of lading for inbound and outbound movements are issued; (3) storage and transit tariff provisions; (4) storage receipts issued by the warehouse distribution center; (5) time limits on storage; or (6) payment of transportation charges by warehouse or distribution center.

Based on this precedent, final mile deliveries between points in the same state would be a continuation of interstate shipments. All FMCSA regulations (including safety, insurance and Hours of Service) would apply to straight trucks and semis. But SDVs have only uniform federal rules governing minimal insurance, cargo claims, and the truth-in-leasing regulations.²¹

Traditionally, the local pickup and delivery of passengers and packages have been provided within commercial zones and left to taxicabs, grocery and pizza delivery contractors without much regulatory attention. The lack of regulatory structure and the political environment surrounding class action overtime, worker’s compensation and misclassification issues, results in additional risk of litigation for this segment of the new paradigm. As Uber and Amazon build out an independent contractor model based on application of state law principles, the field is ripe for class actions involving possible misclassification of drivers as independent contractors – an issue which is more easily defended against if there is strict compliance with federal truth in leasing requirements.²²

Given the vicissitudes of state law, it would seem prudent for shippers and carriers to ultimately rely on an independent owner-operator model and to embrace the leasing regulations of §376 as an

established template for retaining owners of SDVs whether directly or indirectly.²³

Reliance on these federal standards gives some consistency to establishing uniform control, insurance and claims handling practices and a standard for distinguishing recognizable federal instrumentalities of transportation and permissive control issues which become particularly troublesome if left solely to state law.

In this context, it is to be noted that beginning approximately six months ago, some sophisticated shippers began including final mile carrier compliance with the federal leasing standards (Part 376) as a prerequisite for retaining independent contractors as final mile service providers.

Overtime and Hours of Service Issues with SDVs

Class action lawsuits seeking overtime pay for drivers are proliferating against carriers which are subject to the federal hours of service requirement. Particularly prevalent as part of misclassification suits are claims that the driver is an employee and not an independent businessman. The Fair Labor Standards Act which generally requires the payment of overtime after 40 hours, contains an exemption for commercial motor vehicles operating pursuant to the hours of service requirements established by the Secretary of Transportation. Yet the Department of Labor expressly provides that federal exemption from overtime pay that applies to equipment which weighs greater than 10,001 gvw does not apply to SDVs.²⁴

Thus, drivers of CMVs in interstate commerce found to be employees are entitled to \$1,050 per week when on duty 70 hours at \$15 per hour. Yet, with SDV (vans or sprinters) drivers classified as employees would be entitled to \$1,275 or \$225 more due to the application of overtime pay after 40.

In *State of New York v. FedEx Ground Package*, Case No. 402966, the Attorney General entered a settlement for payment of overtime to 500 package

delivery drivers which the state claim were misclassified as contractors rather than employees.²⁵

Thus, overtime pay disputes and the possibility of class action liability would seem a great risk for those who hire drivers or misclassified owner-operators and their customers. Complicating the issue is the fact that final mile delivery drivers are frequently paid not an hourly wage, but by the number of packages delivered or the routes run, regardless of congestion and times spent. In *State of New York v. FedEx Ground Package*, Case No. 402960 / 2010, the Attorney General of New York entered a settlement on December 20 with FedEx for payment of overtime to 500 package delivery drivers which the state claimed FedEx misclassified as contractors rather than employees.

The Boston Globe has reported on retailer “flex offerings” which labor lawyers say “bank on the fact that workers are looking at that big number” but not deductions for equipment, insurance and fees.

Whether done directly or indirectly by encouraging new inexperienced ISPs, developing a dedicated home delivery system for parcels which ultimately relies upon the independent contractor status and favorable tax treatment of SDV operators is risky business. As final mile deliveries, including restaurant and grocery delivery of locally sourced items become more prevalent, litigation over the model will surely increase.²⁶

As the new paradigm expands to include store to customer two hour service using route pricing overtime, worker’s comp and state law benefits will undoubtedly create new challenges.

Major splits in the circuit over state law encroachment on the independent contractor model are focusing on whether state welfare and misclassification laws violate federal preemption and the requirements that states may not make rules which affect interstate routes, rates and services. See *Massachusetts Delivery Ass’n v. Coakley*, 769 F. 2d 11 (1st Cir. 2014); *Dynamex Operations*

West, Inc. v. Superior Court, 4 Cal. 5th 903 (2018).

Clearly, the systemic issue with use of SDV equipment for final mile delivery services is largely dependent upon the ultimate success of the independent contractor model. If the ultimate driver cost, whether borne directly by the retailer or a retained so-called Independent Service Provider (or ISP) as Amazon proposes, requires full driver wages, benefits, insurance, cost of equipment and fuel, the allocated up-supply chain cost of using SDV operators would be prohibitive. If state law applies to the use of SDV operators, retailers cannot count on a poor man’s indemnity and must assume the risk of inconsistent state law.

In this context, Amazon reportedly is not hiring drivers but is hiring companies that will employ drivers following the model of hiring “independent service providers.” The Journal of Commerce noted in this context: “This issue of are these contractors or employees is not going to go away, especially with union membership on decline.”²⁷

If final mile delivery, particularly where SDV equipment is used, is not considered interstate freight and subject to uniform treatment of independent contractor status, state and local labor laws will create major obstacles for the new paradigm. A harbinger of things to come may be Amazon’s decision to withdraw its announced creation of 25,000 new jobs in the state of New York following the statement of New York Mayor de Blasio: “We are a union town,” ... “there is going to be tremendous pressure on Amazon to allow unionization and I will be one of the people bringing the pressure. I believe that ultimately that pressure will win the day.”²⁸

If home delivery costs are left to the vicissitudes of state labor laws and independent contractor issues, offering free freight to all on uniform pricing and slim margins will be difficult to sustain.

PART III

OTHER POTENTIAL PROBLEMS IN IMPLEMENTATION OF THE NEW PARADIGM

In addition to the serious vetting, regulatory insurance and contracting issues with final mile deliveries discussed above, a sober assessment of the model requires consideration of several remaining issues:

Reasonable Dispatch

The common carrier standard for interstate motor carrier service is “reasonable dispatch.” That term is defined in the uniform bill of lading as, “No carrier is bound to transport said property in time for any particular market or otherwise than with reasonable dispatch.”²⁹

The public expects, and carriers are required to provide reasonable dispatch; however, expedited service beyond the carrier’s standard holding out is usually provided at additional cost. In the retail environment, these additional costs for expedited service have traditionally been addressed in the e-commerce environment with higher delivery cost options charged and passed on by the retailer to the integrated national parcel delivery provider with whom it contracts.

The promise of “free freight and free returns” has proven to be an attractive marketing tool which presupposed that the real cost of premium carrier delivery services can be mitigated by reduced inventory costs.³⁰ The free freight and free return promise necessitates rock bottom pricing, guaranteed expedited service, and a system for handling free astrays.

The automotive industry has been following a lean logistics model for years, insisting on just-in-time (JIT) deliveries from suppliers to avoid inventory costs. Frequently managed by third party 3PLs, JIT automotive contracts can impose draconian penalties on their suppliers and carriers, including charter plane service requirements if scheduled

appointments are missed. The retail industry, with overseas suppliers, difficult to forecast seasonal sales, and far more SKUs is pushing its suppliers and carriers to obtain consistent expedited service with far more variables including penalties without premium pricing. Excessive use of telemetrics and demand for time of delivery can be considered coercive and subject the shipper to additional contaminating “control” issues under state and federal law.

Free Returns

Under general principles of federal transportation law, the statutory obligation of carriers for cargo loss or damage claims is “the full actual value of the damaged or lost articles” subject to the consignee’s obligation to mitigate damage, inspection of a damaged article, and salvage.³¹ The “free returns” sale offerings of internet retailers is a reflection of a relatively new shipper-initiated contractual substitute for accepted statutory claims handling. Retailers and grocery houses in particular, increasingly insist their suppliers on prepaid or their carriers on collect shipments waive their duty to mitigate, permit the rejection of any shipment which fails to make an appointed delivery, and absorb or waive any detention to arbitrary restocking fees.

These contractual requirements outrun the cargo insurance terms available to most service providers, making hash out of established claims resolution procedures. When this right to simply reject delivery for any reason is extended downstream to the home consumer, established claims procedures become irrelevant.³²

The following examples will demonstrate these risks:

Example 1: A substantial middle mile carrier specializing in expedited service under contract with an e-commerce retailer delivered thousands of home furnishing shipments to final mile carriers for home delivery. Each shipment was carttoned. The majority of shipments originated overseas and the contents were not examined. Without rejection, the delivering carriers accepted all tenders, marking on

bills of lading any superficial damage to outside containers.

The e-commerce retailer filed no cargo claims and ultimate disposition of the shipment was not made known to the middle carrier. When the e-commerce retailer defaulted on its freight charge payment obligation, it filed notice of 3,048 claims totaling \$2.7 million which it offset against freight charges otherwise due and owing. The ultimate disposition of the cargo and value of the claims was never determined due to the insolvency of the e-commerce retailer which in turn precipitated the insolvency of the carrier.

Example 2: Free Astrays. A big box retailer contracted with a high-end overseas furniture manufacturer to fulfill internet sales order FOB home delivery contingent upon the consumer's acceptance and payment of the order.

The manufacturer shipped furniture to the U.S. for subsequent distribution and hired an established furniture hauler to deliver consolidated shipments to a Canadian distribution carrier for delivery. Over a short period of time, \$50,000 worth of furniture was rejected by consumers throughout Ontario for unidentified reasons. When the big box retailer rejected payment for failure to make delivery, the shipper learned that the Canadian carrier was holding the shipments as free astrays and asserted its lien for delivery, recovery and storage.

Example 3: Seasonality. Depending upon the items, product characteristics like seasonality, shelf life, and surge demand test the ability of the new model to offer the lowest cost and make expedited deliveries without paying premium pricing. In this example, a big box retailer, apparently after negotiating a substantially discounted price on lawn furniture, offered the home and retail delivery portions for bid to several experienced freight forwarders. The winning forwarder, relying on established relationships with established expeditors, undertook the job at unsustainable rates. In response to slow pay inquiries, it stated that payment from its customer was slow. As a result,

the carrier asserted their liens, stopped delivering the seasonal lawn furniture and notified the forwarder's customer. The forwarder filed for bankruptcy. Millions of dollars in unpaid freight charges were left outstanding. Scores of final mile expeditors were left with hundreds of sets of lawn furniture lined up and ready for a yard sale pending amicable resolution of the issue with the retailer.

Clearly, engineering and cost-effective return programs for e-commerce is a major issue. The National Retail Federation reports 58% of all shoppers were expected to return holiday gifts. Shippers and retailers are working with their logistics providers to shore up their returns and restocking programs. Large technologically savvy 3PLs are testing technology solutions for viable reverse logistics programs.³³

The large number of concealed damage claims and otherwise rejected home delivery shipments resulting from the "free returns" offering is forcing suppliers, retailers and carriers to rethink traditional claims adjustment programs and establish claims, rebates or allowance programs to benchmark and allocate risk and salvage without establishing thousands of claims for low value goods.

Transportation Costs is the Ultimate Issue

The cost to retailers of e-commerce home delivery model and the "free freight and free return" sales proposition is the ultimate issue. Amazon, the industry leader in the development of the new paradigm, is reported to have increased its gross sales by 20% and is now the largest capitalized corporation in the world yet its stock valuation has lost 25% in the last quarter. See "Amazon Takes Top Market Cap Crown," WSJ 1/8/19 at B3.

Whether the risk of increased labor costs and vicarious liability, the regulatory uncertainty by final mile deliveries and other issues set forth above have any effect on its market price is difficult to tell. Yet, Amazon has recognized a new acronym which is clearly a driving factor in its establishment of the new distribution paradigm. "CRaP" stands for "Can't

Realize a Profit.” This is the term it applies when the delivery cost of low value items is too great to be absorbed in its sales margin, resulting in home delivery of many SKUs being loss leaders.

Amazon’s response, like the reported response of grocery houses and big box retailers with whom it competes is to increase its profit margin by recognizing additional supply chain and procurement savings at the expense of its vendors and carriers.

As a result, suppliers are pushed to cut costs or increase the value of retail sales price of values shipped, with continuing pressure to reduce transportation costs of first, middle and final mile carriers.

Recent reports that Amazon intends to “insert its transportation spend” is adding to carriers’ reluctance to serve it. Transport Topics reports Amazon is curtailing business with XPO losing \$600,000,000 annually and intends to set up its own competitive for-hire distribution network to compete with FedEx, UPS and other similar motor carriers.³⁴

Retailer volatility and bankruptcies such as Toy-R-Us and Sears exacerbate the turbulence created by the new model clearly resulting in new risk and price pressure on suppliers and transportation service providers in particular. Many traditional truckload, LTL and expedited delivery carriers seem to believe that the CRaP acronym applies to them and have concluded that, as of now, the risks are too great; and the costs are too high to make a profit under the service terms and rates retailers demand, particularly for the SDV.³⁵

In many instances, reasonable dispatch has been abandoned and penalties for failure to keep appointment times as well as uncompensated detention is being imposed. Traditional local pickup and delivery providers have largely eschewed participating in-home delivery services, particularly where SDVs are involved because under the prices offered for the service required, most believe they “Can’t Realize a Profit.” Substantial efforts are being made to enroll new “independent service providers” with the lure of equipment financing, help

in obtaining insurance and the promise of unlimited growth potential.

Important distinctions are being drawn between Uber and Lyft, ride hailing services and home delivery of cargo. Stiff price competition, expedited delivery guarantees, coupled with promises of free freight and free return is driving retailers to propose non-compensatory service propositions. In one example, one established, licensed, authorized and insured SDV carrier was offered an average of 150 deliveries per day for \$225 or \$1.50 per stop. The delivery route would require a commute during rush hour across a major metropolitan city and require a minimum of 10 to 12 hour on duty per day. The experienced carrier quickly confirms that the amount was non-compensatory.

Technology, changing customer preferences and convenience have irrevocably changed retail sales and more changes are coming. Driving down delivery costs and the cost and risk associated with driver pay is a major impediment to the “free freight and free return promise.” When and if bots, drones, and autonomous trucks will replace the need for drivers, whether employees or independent contractors remains to be seen.³⁶

CONCLUSION

Technology, e-commerce and expedited home delivery is quickly grabbing market share and shifting retail distribution to a new paradigm which will replace or augment supply chain management for retailers. The model is not one-size-fits-all but retailers across product lines are making innovations in response. Price competition driven by comparison shopping and e-commerce options result in retailers squeezing suppliers and carriers to provide premium short notice guaranteed services.

The traditional final mile parcel delivery service – FedEx, UPS and USPS and others – are facing new competition as retailers attempt to take over management of final mile delivery to compete with the promise of “free freight and free returns.” This oxymoron – neither freight nor returns are free –

assumes that the retailer's spread and increased efficiency can cover the cost of transportation as well as returns and restocking fees.³⁷

The final mile segment of the new paradigm, particularly when non-commercial motor vehicles are used, is the most risk prone, problematical area involved in implementation of the new paradigm. Retailers understandably eschew establishing private carriage operations for final mile delivery and are left to recruit or hire service provider logistics companies to provide for independent contractors which can meet strict contractual requirements and offer meaningful indemnification against up-supply chain vicarious liability and employment law obligations under state law.

Vetting issues, the lack of verifiable safety compliance and insurance standards, and the vicissitudes of state laws creates added risk for the SDV segment. The consensus among carriers and 3PLs offering expedited services and those operating SDVs in particular appears to be that retailers' home delivery value/price options are not sustainable and that they Can't Recover a Profit at the transportation rates retailers expect to pay.

Currently there appears to be a lack of experienced, well qualified and truly independent carriers willing to take on final mile deliveries for the compensation offered. Traditional brokers and forwarders are experiencing shipper pressure to offer complete home delivery management, but many seem reluctant to take on the risk and challenges of arranging for SDV services. Creating new independent service providers to insulate retailers against class actions, misclassification and up-supply chain liability is problematical, particularly when the indicia of control by the retailer is ever present and the SDV operator is undercapitalized and difficult to vet.

The issues and risk with the e-commerce home delivery model discussed above will become more prominent as Amazon pushes the envelope to compete with FedEx and UPS providing

warehousing and delivery of shipments it neither owns nor distributes.

Clearly, Amazon is the wild card in the future development of the new retail paradigm. From its e-commerce/home delivery model it is building its own expedited logistics/carrier network to compete with FedEx and UPS. It is building local warehouses throughout the country to offer same day deliveries and implementing an "Uber-like" contractor model to support it. After mixed results with its food delivery business, Amazon announced it is entering the retail grocery business, building and acquiring brick and mortar grocery stores. Shares of Kroger tumbled 4.5 % and Amazon gained 2% with the announcement.³⁸

How it and other shippers will ultimately frame and vet their use of SDV equipment in conformance with federal and state safety, employment laws and insurance requirements is yet to be determined.

(Footnotes)

¹ Federal Express and UPS led the fight for deregulation and the F4A. The so-called "Filed Rate Doctrine" was repealed. By the early 1990s, shippers began dictating their own contract terms and utilizing neophyte truckload carriers with newly available nationwide authority. See 49 U.S.C. 13902. The list of 100 largest interstate carriers today is a testament to the competitive effect of deregulation.

² Johnson, Spencer. *Who Moved My Cheese?: An Amazing Way To Deal With Change In Your Work And In Your Life*. New York: Putnam, © 2002; 1998. "Department Store Makeovers Show Way to the Future," Wall Street Journal (December 27, 2018) at p. 2.

³ Retailer Warehouses Get Taller, More Sophisticated, "Wall Street Journal (January 23, 2019) at B7.

⁴ “Winners in Traditional Retailing are also Winning Online,” by Elizabeth Winkler, Wall Street Journal (June 8, 2018).

⁵ See “Produce or Else: Wal-Mart and Kroger Get Tough With Food Suppliers on Delays” WSJ 11/27/17.

⁶ This disruptive trend has led to retailers’ insistence on waiver of any duty to mitigate damages, “free returns” push to the supply and wasteful destruction of perishable commodities as “free astrays.”

⁷ See New York Times 12/22/18 at B5.

⁸ “Amazon Pushes Delivery Service,” Wall Street Journal (1/24/19) at B1. “Amazon Pressures Suppliers,” Wall Street Journal (12/17/2018) at A1, A11.

⁹ Malls Devote Floor to E-tailers,” Wall Street Journal (1/16/19) at B6.

¹⁰ “Amazon Sets Up Shop in the Heart of the Publishing Industry,” Alexandra Alter, New York Times (5/24/17).

¹¹ New York Times 12/22/18 at B5.

¹² “Retail Sales End on High Note,” Wall Street Journal (12/24/18) at A2

¹³ See “Walmart Posts Big Holiday Gains,” WSJ (2/20/19), p. A1 and A2

¹⁴ “Grocery robots are even being tested to pick call-in orders and replenish. “The Grocery Robot is Here,” Wall Street Journal (January 5-6, 2019), B4

¹⁵ “Produce or Else: Wal-Mart and Kroger Get Tough with Food Suppliers on Delays” Wall Street Journal 11/27/17.

¹⁶ “J.B. Hunt Buys Cory to Expand in Final Mile Heavy Item Sector” Transport Topics (1/14/19) p. 1, 25.

¹⁷ See “Amazon Recruiting Delivery Entrepreneurs” by Joseph Pisani, Inside Logistics (June 29, 2018).

¹⁸ “Task Force on USPS Goes After Amazon,” MKinnon and Ziobro, WSJ 12/5/18 at A1, A11.

¹⁹ *Massachusetts Delivery Ass’n v. Coakley*, 769 F. 2d 11 (1st Cir. 2014); *Dynamex Operations West, Inc. v. Superior Court*, 4 Cal. 5th 903 (2018); but see *Angel Omar Alvarez v. XPO Logistics Cartage, LLC* (2:18-cv-03736-SJO-E) (District Court, C.D. California); *Bedoya v. Am. Eagle Express*, Civ. No. 14-2811, 2017 WL 4330351 (D.N.J. Sept. 29, 2017).

²⁰ See *Labor Commissioner for the State of California v. Federal Motor Carrier Safety Administration*, Case No. 19-70329, in the U.S. Court of Appeals for the Ninth Circuit.

²¹ 49 C.F.R. 387.303, 48 C.F.R. 376 and 49 C.F.R. 370.

²² See *Raef Lawson v. GrubHub Inc.*, Case No. 18-15386 in the U.S. Court of Appeals for the Ninth Circuit.

²³ The term “independent service provider” is not a term of art recognized or used to describe independent authorized carriers or leased operators under federal transportation standards and should be avoided as a “state law” term without defining precedent and militating need for uniformity in interstate commerce.

²⁴ See “Fact Sheet #19: The Motor Carrier Exemption under the Fair Labor Standards Act (FLSA),” U.S. Department of Labor Wage and Hour Division, November 2009.

²⁵ New York, Massachusetts, California and now New Jersey and Illinois have raised state minimum wage requirements to \$15.00 per hour. See New Jersey Lawmakers reach deal to make state minimum wage \$15 (NYT 1/18/19 at A19).

²⁶ *Raef Lawson v. GrubHub Inc.*, Case No. 18-15386 in the U.S. Court of Appeals for the Ninth Circuit.

²⁷ “Amazon’s third-party delivery network to redraw truck capacity,” by William B. Cassidy, Journal of Commerce (June 30, 2018).

²⁸ See Wall Street Journal (February 14, 2019) at A16.

²⁹ See Standard Bill of Lading Section 2(a).

³⁰ In many instances big box and e-commerce retailers may use supplier inventories to further reduce inventory costs.

³¹ See 49 U.S.C. §14706, the Carmack Amendment.

³² “Produce or Else: Wal-Mart and Kroger Get Tough with Food Suppliers on Delays” WSJ 11/27/17.

³³ “Logistics Companies Aim to Ease Returns, Keep Costs Low Amid E-Commerce Rise,” Transport Topics (1/14/19) at p. 1 and p. 18.

³⁴ See “Amazon Moves Supply Chain Evolution,” (Transport Topics, 2/25/19) and “Amazon.com ‘Insourcing’ Roils Freight Industry, Analysts Say,” (Transport Topics 2/21/19).

³⁵ “Amazon Pressures Suppliers,” Wall Street Journal 12/17/18 at p. A1 and A11.

³⁶ Robots are being tested for use in e-commerce warehousing. See “Warehouses Test a New Breed of AI Robots,” Jennifer Smith (WSJ 1/08/19); “Amazon’s Private Fleet Appears to be Testing Autonomous Trucks,” Commercial Carrier Journal (February 1, 2019).

³⁷ “58% of holiday shoppers returned items,” National Retail Federation says. See Transport Topics, 1/14/19, p. 1. 79% of e-commerce shoppers believe free returns is important, yet “not only moving the box but also testing, repairing, restocking and disposing of goods creates cost.” Ibid.

³⁸ See “Amazon Pushes into Groceries” (WSJ 3/2/19) at p. A1, A4.

BIOGRAPHY

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IN-TRANSIT CARGO CRIME IMPACTING THE RETAIL SUPPLY CHAIN

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ABSTRACT

Surveys of retail security directors show that almost half of those polled had been the victims of a supply-chain disruption directly related to cargo theft. This is a significant increase from just five years ago. In order to fully understand the issue of cargo theft, retailers need to know why it exists, who is perpetrating it, how risk can be reduced, and ultimately how to react to a loss. This article explores a number of dimensions of the issue, and offers several suggestions for mitigating the risk and dealing with theft after it occurs.

INTRODUCTION

Surveys of retail security directors showed that almost half of those polled had been the victims of a supply-chain disruption directly related to cargo theft. This is a significant increase from just five years ago.

Envision the following scenario. You are at home around 8:15 at night watching television with your wife or kids when the phone rings. The caller is one of your regional loss prevention managers in the Southeast. He tells you that you just had a tractor load of high-end apparel worth \$2,000,000 stolen in Florida while parked at a truck stop. The driver had gone in to use the facilities, and when he came out ten minutes later his tractor and trailer were gone. While no one ever wants to receive a call like this, you can be prepared for it.

In order to fully understand the issue of cargo theft, you need to know why it exists, who is perpetrating it, how you can reduce your risk, and ultimately how to react to a loss. Good loss prevention programs involve some form of a “layered” approach. Based on the exposure, some, if not all, of the following countermeasures may be employed—surveillance cameras, alarms, locks, lighting, EAS, safes, employee awareness training, and others. Loss prevention professionals would be remiss in their duties if they did not explore all of these attributes to secure their stores.

That said, remember that virtually 100 percent of the merchandise in retail stores is delivered by truck. In many cases the only two preventative measures put in place to secure that same merchandise in transit is a key to the tractor and a seal on the rear doors. On any given night there are hundreds of thousands of loads of merchandise parked in unsecured locations around the country. This is a well-known fact to various criminal elements, from organized Cuban and Eastern European cargo-theft crews to local gangs like MS-13.

SCOPE OF THE PROBLEM AND IMPACT

Risk vs. Reward

The average value of a stolen shipment in-transit last year was \$137,716 according to CargoNet, a risk management service provider. Compare that figure to two other serious crimes—bank robbery, which according to FBI statistics nets roughly \$2,500 - \$4,000 per event, or a typical organized retail crime (ORC) that nets about \$8,000. There’s obviously a large disparity in the net profit out of each of these crimes. There is also a great disparity in the punishments if apprehended for each of these offenses.

Someone convicted of ORC can face up to three years imprisonment. A convicted bank robber typically receives a five- to ten-year prison sentence. An apprehended cargo thief, however,

routinely faces very minimal incarceration and, more often than not, receives some form of probation...yes, probation. One example is a career cargo criminal from South Florida who operated out of New Jersey. This Hispanic male was arrested nine times for full trailer-load thefts but spent less than two years in prison...total, for all of these offenses.

In most cases the cargo thief goes undetected in the commission of his or her crime and is very rarely confronted by law enforcement, who aren't made aware of what has occurred until long after the shipment is gone.

A key event that increased the popularity of this type of crime occurred in 1986, when the government passed the Anti-Drug Abuse Act. This placed mandatory minimum sentencing guidelines in a continuing effort to fight the war on drugs. The guidelines were stiff, with long minimum prison terms if one were caught selling drugs. These stiff sentences forced certain criminal elements to find new revenue streams. With its low risk versus high reward, cargo theft presented a new business opportunity for these criminals which continues today.

A Rising Trend

In the past five years cargo-theft crimes have risen over 50 percent and are still climbing, much of which is attributed to better reporting of these types of crimes by transportation companies and law enforcement alike. The annual losses attributed to these thefts are estimated in the billions of dollars. The disparity in attention attributed these numbers is tied directly to the common perception that these types of crimes are essentially "victimless."

The lack of formal reporting of cargo-theft incidents has also been a significant hindrance in getting any assistance from the government. In 2006 as part of the Patriot Act renewal, an amendment was added that designated cargo theft as a Part 1 crime that must be reported within the Uniform Crime Report (UCR) system. Unfortunately, as we sit here thirteen

years later, the FBI has still not completed the collection and dissemination processing of that data.

Although cargo theft occurs all over the country, there are higher than average concentrations centered in states that have major port activity, as many of these thieves desire access to as much freight as possible. It's important to understand that these criminals fall into two significantly different types. The first type of cargo thief is simply looking for the opportunity to steal virtually any load; while the second targets specific merchandise. Both illicit groups are professionals, yet they go about their trade using different methodologies. The opportunistic thief typically targets any loaded trailer left unattended in a relatively unsecure location. This could be a truck stop, mall parking lot, or even in or near your store or distribution center.

However, the thieves targeting specific merchandise operate quite differently. They will first decide, or be directed to, a particular desired product—a certain brand of cell phone, a particular pharmaceutical product, tobacco products, and so forth. They will conduct pre-trip research looking into locations of associated distribution centers within a specific geographic area. They will also look for proximity to interstate highway systems, the locations of law enforcement facilities and activity, as well as weigh stations. There have actually been times when these particular thieves have been caught with shopping lists, either on their person or in their vehicles. The lists describe specific items to steal, as well as where to find them. These same criminals have also been found with police scanners and other forms of cargo-theft tools.

The perpetrators will typically work in teams, conducting surveillance on both facilities and drivers to understand how those in the facility distribute shipments and how the drivers act when picking the loads up. Sometimes the thieves will hit drivers on the road, following them in multiple surveillance vehicles and trailed by another tractor. The tractor will be utilized as a substitute once the rig has been stolen. This type of surveillance sometimes lasts for hundreds of miles, or until the driver needs to make

a stop. Once the driver leaves the tractor-trailer unattended, it typically takes the thieves less than one minute to break into the locked cab, hotwire the unit, and subsequently drive off with the load.

In these scenarios the thieves look to get rid of the original tractor as soon as possible, substituting it for the one they brought along. The original tractor is almost always recovered a few miles from the original theft location. All of this is done to better disguise the two-part unit as the getaway is being made, but also to attempt to evade any GPS tracking on the original tractor. The thieves may do something similar with the trailer, also attempting to see if GPS tracking technology is being used to locate it. In many instances they'll take the trailer to a remote location, place it under surveillance for several hours, and wait to see if someone comes for it. If no one does, their natural assumption is that there isn't any tracking technology either attached to the trailer or buried inside the shipment.

If the plan involves the burglary of a facility, as opposed to an in-transit theft, once the target location has been selected, a team of specialized criminals will attack it. Each member of the team will have a specialized talent, such as picking locks and defeating alarms and CCTV. They will have team members trained on operating material-handling equipment as well as general laborers to load the stolen goods.

Leakage and Fictitious Pickups

Two other forms of theft have become much more common in recent years—"leakage" and "fictitious pickups." Leakage occurs when a thief, which could even be one of your own employees, gains access to the contents of a trailer without your knowing about it. There are countless methods for gaining access to a trailer's contents and still making it appear as if the trailer doors were never opened after being closed for delivery. The easiest is simply to break the seal on a trailer. More complicated, but not by much, is to bypass the seal. In bypassing a seal, thieves have been known to remove rivets on

the locking hardware so that the handle assembly essentially remains intact and sealed, but no longer engaged as the entire assembly is removed. Thieves can also remove the trailer doors altogether, again maintaining seal integrity, but affording access to the trailer's contents.

One of the most prevalent forms of theft, the fictitious pickup, is growing in popularity because in many instances it is unusually simple to execute. Would-be thieves target a load they are interested in via any of the thousands of electronic "load boards" used by the shipping industry to advertise loads available for tender. Once the thieves select a load for theft, they begin the process of illicitly obtaining the identity of a real certified carrier. These thieves will use disposable cellphones, create bogus email addresses, fabricate insurance paperwork, and ultimately represent themselves as the legitimate carrier. The unsuspecting victim assigns them a pickup time and location to obtain the shipment. All the thief then needs do is show up. The load is given directly to them. Only after the delivery has failed to reach the intended customer does the theft become realized. These are typically Friday pick-ups that are not scheduled to be delivered until Monday or Tuesday, thus giving the thieves a 48 to 72 hour head start before anyone realizes the load has been stolen.

Impacts of a Cargo Loss

What are the impacts beyond just the loss of the merchandise? Consider the following:

- **Cost of Replenishment**—A trailer load that is stolen and can't be delivered must be replaced rapidly. The costs associated with this, together with re-picking orders, transportation, and staffing costs, all affect bottom-line profits.
- **Customer Retention**—Losing an existing customer because product they desired has been stolen in-transit or in-storage can be even more damaging to a retail operation.

- **New Customers**—We essentially live in a society that demands immediate satisfaction. If you do not have an item in stock because it's been stolen from you, that customer will likely not wait for you to replenish your inventory. They will simply shop somewhere else.
- **Lost Sales**—Often these stolen products are reintroduced back into a secondary, albeit, “grey market,” supply chain, which erodes the chance for that same sale in your store.
- **Fraudulent Refunds**—Stolen merchandise often reappears in local stores in the form of fraudulent refunds that drag down same-store sales numbers.
- **Increased Insurance Premiums**—The cost to insure your goods in-transit will obviously be passed on to customers. These higher insurance premiums will make a retailer less competitive on sheer price point.
- **Lost Margin**—The difference between the cost of the item and the retail value is not recovered by most insurance programs as

they usually are designed to protect the shipper at cost.

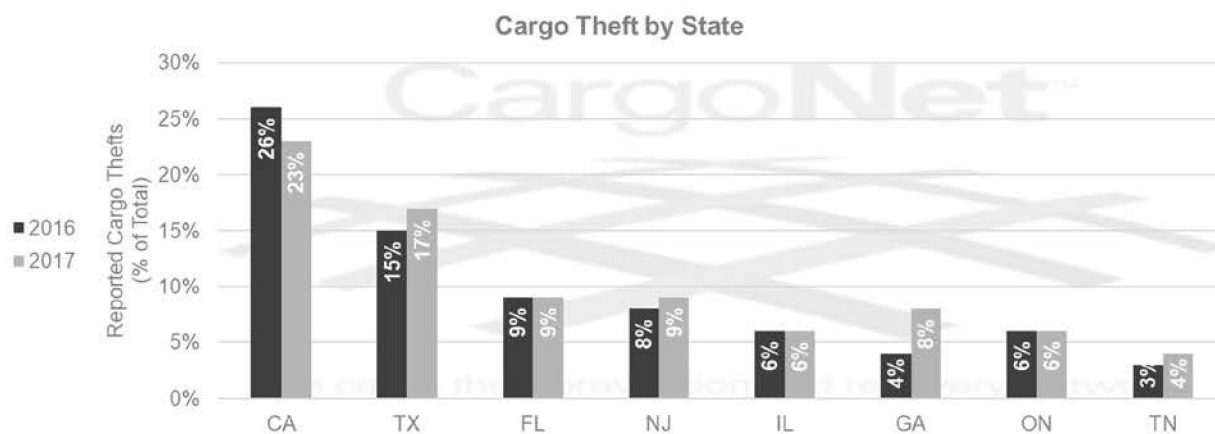
- **Loss of Brand Reputation**—Once you are identified as an easy target, it is difficult to rebrand yourself, and you may begin the downward spiral where, not only does the bad guy see you as an easy target, but your brand begins to be marginalized among your consumer base.

If you feel this is painting a pretty grim picture, then good, that is precisely what you should be feeling. However, there is light at the end of this tunnel.

MITIGATING PROGRAMS

The thieves don't always have to win. There are several security layers that can be added into a supply chain to significantly reduce risk and, hence, your exposure to loss. One of the first things to understand is what your exposure to theft actually is. For instance, in what areas of the country do you operate? There are several cargo theft “hot spots” in the United States that include certain areas within the states of California, Texas, Georgia, Florida,

FIGURE 1
CARGO THEFT BY STATE



Year	Sum	Average
2016	\$116,996,809.00	\$201,719
2017	\$81,595,769.00	\$167,893

Tennessee, Illinois, and New Jersey (see the graph above). If you move or store goods in any of these states, you have a much higher probability of becoming a victim of a cargo theft as opposed to other states in the country.

Do you control the delivery of your merchandise with an in-house proprietary trucking fleet? Many retailers are moving away from maintaining their own transportation to focus more on their core business of retailing. Those that do maintain their own fleets, however, have a distinct advantage; from screening and hiring their own drivers; to making investments in security devices to add to their fleet of tractors and trailers; to establishing proprietary in-transit policies and procedures that your specific drivers use while transporting shipments.

More often than not, however, many companies contract out their transportation services and do not, necessarily, have direct control over their transportation providers. That being the case, there are many best practices that can be put into place contractually to ensure that your exposure to potential theft is reduced. Some of these mandated best-practice policies for third-party providers should include the following:

- Requiring stringent background checks for all drivers and anyone who has visibility of your critical shipment information.
- Producing policy-and-procedure manuals that include security requirements and can be randomly audited.
- Maintaining excellent DOT compliance records to ensure load confirmation is sent to the actual carrier retained to provide the service.
- Requiring drivers to produce a valid driver license and vehicle registration, upon demand, before any shipment loading can take place.
- Making drivers aware of, and signing off on, your specific security requirements on each individual trip.
- Ensuring that drivers know how to contact you in any emergency.

- Obtaining drivers' contact information so that you can readily reach them at any time during a shipment trip.
- Having drivers arrive with a fully fueled vehicle to minimize the number of stops necessary to make a delivery.
- Ensuring drivers route themselves directly to the point of delivery, as safely and efficiently as possible within lawful bounds and with a minimum number of stops.
- Requiring that there are no stops made within the first 200 miles of a delivery trip.
- Installing GPS tracking technology on both tractors and trailers.
- Instructing drivers to lock any unattended tractor-trailer with the engine turned off.
- Suggesting that trailers should be parked with their rear doors against a fixed object to prevent them from being opened whenever possible.
- Ensuring that loaded trailers are secured with a sufficient locking device at all times. If a loaded trailer must be "dropped," some form of approved locking device such as a king pin, glad handle, or landing gear lock should be deployed.
- Giving store security the right to inspect the driver's tractor and trailer for stolen merchandise before the driver leaves.
- Ensuring that name of pickup carrier is provided by broker and is reflected on equipment at time of tender.

Let's not forget that professional drivers are our knights of the highways and should be recognized for their top-shelf efforts and incentivized for superior performance as well. Don't create an unbalanced program that focuses on the punitive without recognizing the positive.

Other Areas of Opportunity

It is important that you work with your distribution and store operations group to fully understand delivery schedules. It is noteworthy that thieves

prefer to steal loads on Fridays, Saturdays, Sundays, and holidays, when drivers are often forced to leave loads unattended for long periods of time while they await delivery appointments. Thieves also use these weekend periods to steal shipments in the hope of delayed detection. Therefore, shipping Monday through Thursdays, with a contemporaneous delivery before the weekend period greatly reduces a retailer's chance of being targeted by a cargo thief.

It is also critical to perform route risk analysis on individual lanes, particularly in areas with which you may not be entirely familiar. There are now information resources available that can provide city-level risk mapping based on historical data that can be used to set up a driver's particular route. All that is required is to enter the pickup and delivery locations. The risk management program will map out the driver's trip, highlighting areas that have been prone to cargo theft in the past. Using this type of analysis, you can create "no stop" zones based on the prior history of theft in that community. Many companies instruct drivers to not stop at least one hour before or one hour after these known "hot spots."

GPS Technology

Many logistics-security professionals believe that cargo thieves literally have a manual of their own that could be entitled "Cargo Theft 101." From the repetitive methodology used to commit these types of crimes, one of the chapters in this manual includes the disabling of any visible GPS tracking technology on the tractor or the trailer.

Over a relatively short period of time, GPS tracking technology has become much more sophisticated than in the past. Although a layered approach to cargo-theft prevention and detection is always recommended, GPS tracking capability is probably the single greatest asset that exists in investigating and ultimately recovering stolen cargo.

The accuracy of current GPS units is now at all-time highs—to within a hundred feet—which aids

locating a stolen shipment fairly rapidly. As stated above in contractual best practices, if you have a transportation provider that does not offer GPS tracking of its tractors and trailers, you should definitely mandate it. It not only serves in the recovery of full trailer-load thefts, it also helps to identify potential acts of pilfering. Finally, it's invaluable in tracking driver behavior as well.

Devices no longer need to be installed or placed in visible areas to "see the sky" so to speak. Technology has advanced to the point where devices can be inserted either within the vehicle itself or within individual shipments being transported inside a truck or trailer.

Portable GPS tracking devices are now routinely used by retailers to ensure that their service providers are following proper procedures and to add an additional layer of security in the event of a theft. Some of these units are so small they can fit inside a 100-count pill bottle and are easily rechargeable. The progress of shipments containing these devices can easily be monitored on a computer, tablet, or smartphone. Automatic alerts can also be configured for any of these devices if there is ever an unscheduled deviation from designated route.

CHANGING OF THE TIMES

Ten years ago it was relatively rare for transportation risk managers to interact with a retailer's supply-chain loss prevention representative...if they even had one. That has changed significantly over the past few years. Virtually all major retailers now have someone responsible for supply chain risk analysis and security who is responsible for ensuring safe and secure delivery of their respective merchandise.

Over many years in this profession, I've had the opportunity to speak on this topic at loss prevention, logistics, and law enforcement conferences. I try never to miss an opportunity to

meet with law enforcement entities who may someday be working a case when one of my trailers turns out to be missing.

The states noted earlier that have significant cargo-theft activity typically have their own dedicated law enforcement team of seasoned cargo-theft detectives and taskforces. These teams typically know who is operating in their areas, where the merchandise may be headed, and who to contact to assist in making a recovery. It is imperative that you or someone within your organization know and remain in perpetual contact with these important law enforcement entities.

Most important is to maintain cell phone contact numbers with these men and women. Why? As previously stated, many of these thefts occur after business hours—at night or on a weekend—and you want to be able to reach out directly to the most seasoned cargo-theft investigators as possible.

I also try to attend as many regional cargo-security meetings as possible. There are numerous local and regional “councils” strategically located in the Northeast, Southeast, Southwest, and Western areas of the United States. Their meetings bring law enforcement, transportation providers, shippers, insurance companies, and retailers together to discuss issues affecting their particular regions of the country. These meetings are invaluable for the information that is shared.

Kurt Duesterdick, chairman of the Eastern Region Transportation Security Council (ERTSC) explains:

“The ERTSC is one of the oldest, if not the first transportation security council in the U.S. It was started in the late ’80s by a number of former members of law enforcement who had transitioned to transportation-security managers. These individuals discovered that they were all experiencing the same types of problems, yet had no way of sharing information. They made inquiries to one another and found there was a need to help one another out, as

they all trying to safeguard the business of their respective companies.”

“The original council consisted of only transportation-security and law enforcement personnel. However, as cargo theft continued to increase, they saw the need to involve loss prevention professionals and investigators from the retail and shipping businesses to assist them in their endeavors by identifying stolen product, tracing serial numbers to specific losses, assisting in investigations and recoveries, and educating law enforcement in the movement of stolen goods.

“Today there are eight different private-sector councils located throughout the U.S. in the fight against both cargo theft and supply-chain enterprise crime. Our council has changed over the years with members reporting thefts and hijackings, as well as providing educational opportunities in the transportation, manufacturing, shipping, retail, and cargo world. We have approximately 425 active members from both the private sector as well the law enforcement community. Our law enforcement partners include, but are not limited to, the state police from New Jersey, New York, Pennsylvania, Illinois, Louisiana, Virginia, Georgia, and Florida. In addition, we have participants from Customs, the FBI, the Waterfront Commission, and several local police departments. We share our intel with the other seven councils, essentially getting this information in the hands of thousands of people who work and investigate these types of crimes.”

THE REST OF THE STORY

Now to finish the story from the beginning of this article. The case was not hypothetical. I had just received a call that we have lost a \$2,000,000-plus load of clothing. The driver claimed to have locked the tractor and had the truck keys in his possession. We immediately checked the tractor’s GPS unit, which indicated the truck was stationary approximately a mile and a half off the highway. I

called the local police who responded to find the tractor abandoned.

We then pulled up the GPS tracking data on the trailer, and it last showed the conveyance was only a few more miles further down the road. Law enforcement was sent to that location, but essentially found nothing.

We then contacted the customer's supply-chain security department and learned they had embedded a portable GPS device inside the shipment. Their GPS data supplier was able to call me with the last known location of that portable device. I notified a contact I had developed over the years with the Florida Highway Patrol. That officer dispatched several of his men to that last known

location, and within 45 minutes a full recovery was made of the stolen shipment.

This is a textbook case on how collaboration between a retailer, a transportation provider, and law enforcement led to a multimillion-dollar recovery.

While in-transit cargo theft is a significant issue, as industry professionals we are fortunate that the tools are there for us to combat this problem and significantly reduce our organization's potential for loss.

(Footnotes)

¹ This article has been updated from its original publication in Loss Prevention Magazine.

BIOGRAPHY

John Tabor is Senior Vice President of Supply Chain for National Retail Systems, Inc. National Retail Systems is the parent company of four unique operating entities that consolidate and deliver freight for many of the country's leading retailers and product manufacturers. In his role he has oversight of operations, loss prevention and safety for 30 facilities, 2500 employees 1000 trucks and 6000 trailers across the country. John also serves as President of 7Psolutions. 7P provides Global Visual Management to biopharma, high-value, high-theft risk cargoes around the world. Their technology is used to manage the critical importance of providing climate control and security monitoring and management for cargo, all while maintaining stringent regulatory compliance. John is a Board member of the Transported Asset Protection Association, Transportation Loss Prevention and Security Association and the National Cargo Security Council. John conducts regular training classes with Miami Dade PD, Memphis PD and the Illinois State PD and various industry associations on supply chain security best practices and conducting proper cargo theft investigations.

ABOUT ITEM RESPONSE THEORY MODELS AND HOW THEY WORK

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ABSTRACT

This article is about FMCSA data and its analysis. The article responds to the two-part question: How does an Item Response Theory (IRT) model work differently . . . or better than any other model? The response to the first part is a careful, completely non-technical exposition of the fundamentals for IRT models. It differentiates IRT models from other models by providing the rationale underlying IRT modeling and by using graphs to illustrate two key properties for data items. The response to the second part of the question about superiority of an IRT model is, “it depends.” For FMCSA data, serious challenges arise from complexity of the data and from heterogeneity of the carrier industry. Questions are posed that will need to be addressed to determine the success of the actual model developed and of the scoring system.

INTRODUCTION**

This article is about FMCSA data and its analysis. The essential question posed to this author was, in the context of FMCSA data analysis, was: - How does an Item Response Theory (IRT) model work differently to make it better than current FMCSA practice or better than any other model? The quick answer is that IRT models are a class of data-based models that are different from other kinds of models because IRT models establish their relevance and validity differently from other kinds of models or scoring systems. From a practical point of view, IRT models focus on items and assign a weight to each one in accord with the acuteness of each item’s ability to distinguish between lower- and higher-scoring (safer and less safe) individuals (carriers).

Whether an IRT model performs better or worse than another model depends on whether the assumptions required for an IRT model are met sufficiently well and also depends on key technical decisions that define the specific IRT model being developed.

An IRT model is no different from any other data-based model in three important ways:

- A data-based model can detect a pattern in the data and give a mathematical or numerical definition for this pattern that can be used to estimate or to predict.

- What can be modeled is determined – and limited - by the information present in the data (unless external or theoretical components are imposed on the otherwise data-based model).
- A data-based model cannot determine the veracity of any datum, whether aberrant or consistent with the pattern.

A longer answer requires first understanding the conceptual basis for IRT models. Then the method for constructing the model and computing a score is illustrated. Finally, attention can turn to the particular challenges for FMCSA data and to the elements that determine how well the model can perform: 1) IRT model requirements: the premises built into the structure of an IRT model, 2) Data used to fit the model: data selected, also both properties and the form of data input, 3) Specifications for the particular model; structure, model precision and accuracy, minimum information required for reliable scoring, and ultimately, 4) Model-based scoring or decision-making: the implementation and reporting of the model and individual scores.

Before going further note that in 4) above, *how* a model or a score is reported or is used depends on administrative decision-making and is not intrinsic to the model or scoring system itself. The kind of model for FMCSA data that is discussed in the NAS report is complex and belongs to the class of

confirmatory MIRTs—Multi-dimensional Item Response Theory models (van der Linden, W., 2018). “Multi-dimensional” means that several distinct aspects of safety will be addressed. In this case six aspects are drawn from BASIC information (excluding the category “Crash Indicator”). “Confirmatory” means that those six aspects have been pre-determined and that the items that address them have already been categorized accordingly.

Thus, this MIRT can be thought of in two stages: modeling separately for each aspect using the relevant items, then assembling the results for the individual aspects into a single score.¹ The guiding concept is the same at each stage.

HOW AN IRT MODEL WORKS

Fundamentals of (Any) Data-based Model

The most general concept for a data model is a specified computation that combines data for a collection of observations/factors/items/measures into a summary statistic. For a data-based model (these include IRT models), data are also used in setting the specifications for that computation.

Models come in many forms. They can be simple (a mean or a total) or complicated; they can be theory-based or empirical; they can be linear, non-linear or they can have no closed form to write down as an equation. Model computations can be pre-specified, be data-based or they can combine a pre-specified computation with a data-based computation.

Regardless of the particular form, all data-based models take in a collection of observations and generate a summary statistic (whether uni-dimensional or multi-dimensional or complex function). The value of any model is limited first by the scope of the factors included in the data and second by the quality (truth, precision, accuracy and relevance) of the data. Whether in addition the model is “fit for purpose” depends on its relevance and the intended purpose.

Different kinds of models and scores lend themselves naturally to different ways of establishing *relevance* (validity) of the model. Prediction accuracy is one measure of relevance when there is an external measurable quantity for comparison (i.e., the true value or a gold standard). If the true value is measured with error, model adequacy can be formulated in terms of the error component.

In the absence of a gold standard, other kinds of data-based models may utilize other auxiliary measures, recruit independent data or consult an expert resource. In any of these cases, without a gold standard the calculation of relevance is subject to variation depending on the particular selection of independent data or expert opinion.

IRT models differ conceptually (Hambleton, R.K., Swaminathan, and Rogers, H. J., 1991). Essentially an IRT model postulates the existence of such a standard (fundamental factor or trait) that is fixed but that is only observable indirectly. Consequently an individual’s true score can only be inferred or predicted based on indirect information. An IRT model optimizes this inference given the available data without recourse to exogenous information.

Concept Underlying IRT Models

Constructing an IRT model of an unobservable fundamental factor depends on having indirect information that can be used to infer/predict that factor’s value based on the indirect information about an individual. In this case, the fundamental factor is referred to as “Safety Culture;” fundamental factors at the first stage are the indices for “Unsafe Driving,” “Vehicle Maintenance,” “Driver Fitness” etc. The indirect information is the data (reported items) that make up the FMCSA data base for each of these first-stage groups. The purpose of the model is to infer/predict each individual’s true factor score, first for each of the first stage factors and then overall.

There are three essential components for constructing an IRT model: 1) the postulated numerically scaled fundamental factor, 2) the *difficulty* of each item, 3) the *discrimination* of each item.

The advantage of an IRT model is that *both* attributes – *difficulty* and *discrimination* – are utilized to infer an individual's factor score the scale from “safest” to “least safe.”

Item *difficulty* is not enough – suppose a candidate item is: Does the operator's birthday date contain a “5”? In one sense this qualifies as “difficult,” meaning that fewer than 10% of operators' birthday dates will be either 5, 15 or 25. But as this conveys no information about an operator's safe/unsafe driving, its inclusion in a model or score can only add noise. To be a useful item, its difficulty (i.e., likelihood of a positive response) must align with the scale of the fundamental factor.

IRT models anchor each item's relevance to the fixed but unobservable fundamental factor with a numerical scale. Hence the importance of *discrimination*, i.e., the capability of each item separately to correctly place an individual (carrier) on the numeric scale based on the individual's response. Since item *discrimination* is the basis for the item weights, the failure of an irrelevant item to *discriminate* along the Safety Culture scale will result in its being given no weight in the score calculation. Other items that fail to discriminate are those where the response is uniform across the safety scale, as for example when the overwhelming number of carriers report that they transport loads of all types.

Conceptually, the relationship among these three elements is depicted by plotting the probability of a “present” response to an item as a function of the true factor score. The graph in figure 1 shows the Item Characteristic Curves for two items, each with an absent/present response where “present” is associated with an unsafe practice. The x-axis gives the true factor score. For each item, the point on the curve (y-coordinate) gives the probability that an individual with factor score given by the x-coordinate will respond “present” to the item.

Item *difficulty* (language borrowed from the education origins of IRT) is defined to be the x-coordinate corresponding to the 50% y-coordinate

point of the curve. In this illustration, the curve for item #2 lies toward higher values on the “safer to less safe” scale; therefore item #2 is “more difficult” (i.e., associated with greater safety risk).

Item *discrimination* can also be visualized from the curve graphed in Figure 1. Note that for item #1 the curve is steeper, indicating that there is a narrow range of true scores for which there is a considerable mixture of responses “present” and “absent.” Hence, item #2 discriminates better than item #1 where a response of “present” would be consistent with a broader range of true scores (also true for a response of “absent”). Technically the definition of discrimination is the steepness (slope of the curve) at the $y=0.50$ point of the curve where the difficulty is also defined (by the x-coordinate).

IRT Models and Scores

The method for constructing an IRT model is most easily seen by solving a simpler problem first. Consider how a model and scoring system would be developed IF the gold standard or true scores could be known for a large enough number of individuals to build a good model. Then the solution for this case can guide the development of a model when the gold standard is unknowable.

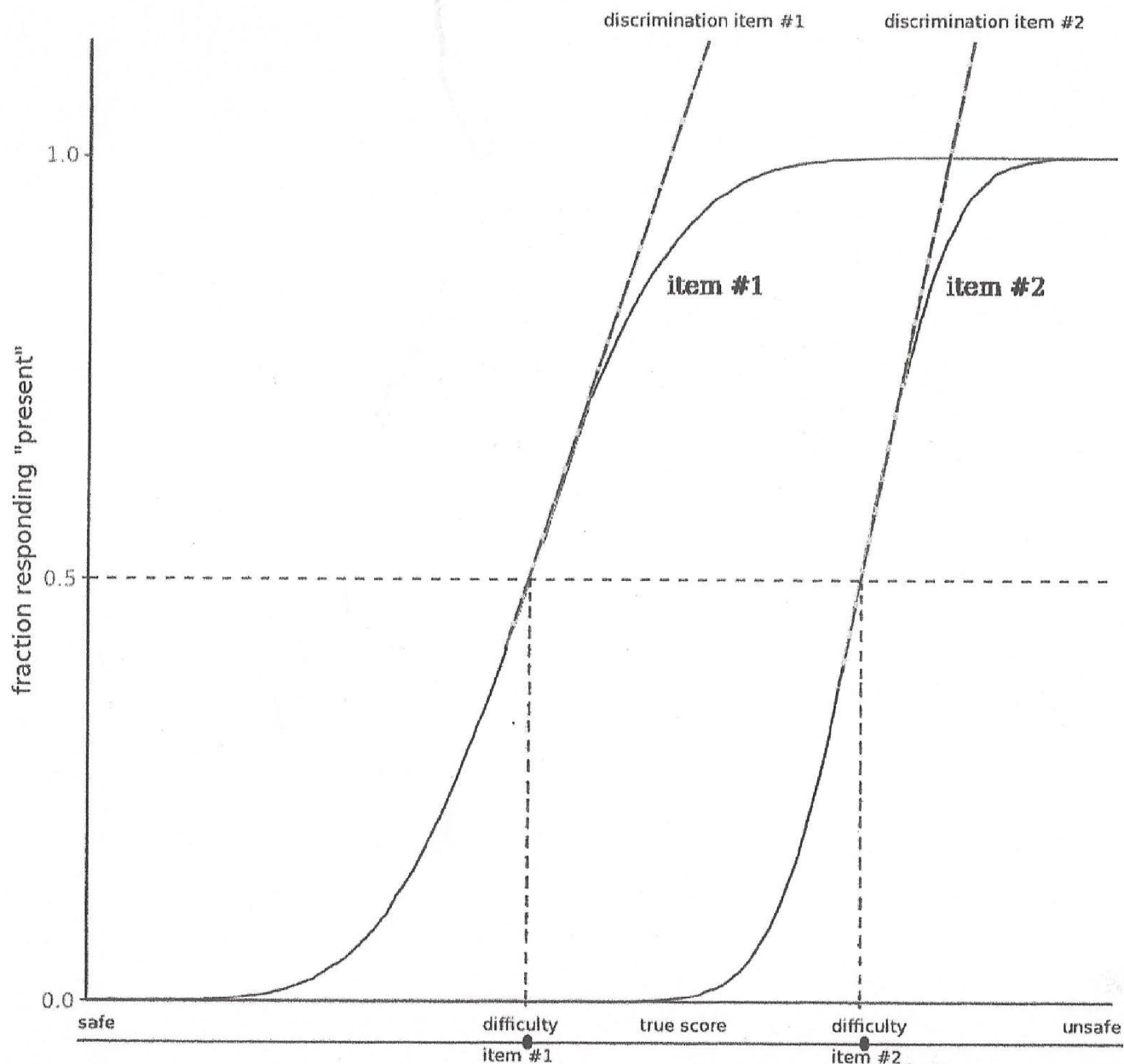
This case is simpler but still needs to create a model to solve two problems – the properties of the individual items and the scoring of the individuals (carriers).

Problem Specification: For just a single aspect/dimension (e.g., “Driving Safety,” one aspect in stage one for an MIRT), suppose the gold standard scores are known for the majority of the population of carriers. For the remainder, a model is needed from which to estimate true (gold standard) scores for the remainder and for future carriers.

Assume that there are five items for this aspect and each requires an absent/present response.

Step One: Take each item one at a time and graph its curve (as shown in Figure 1). The item's difficulty and discrimination can be determined from

**FIGURE 1:
CONCEPTUAL RELATIONSHIPS AMONG FACTOR SCORE, ITEM DIFFICULTY AND
ITEM DISCRIMINATION**



this curve. The curve is created as described above: at each point on the true score scale, record the percentage of “present” responses for all individuals with that true score.² Difficulty can be measured in a usual way, i.e., find the score associated with responses equally divided between “absent” and “present,” i.e., the true score (x-coordinate) for the

50% “present” responses (y-coordinate = 0.50). Discrimination is the slope of the curve at this point.

Step Two: Assemble all the items for this single factor. To see how items compare, the curves for all the items can be plotted together. Items with curves lying toward the left have lower difficulty; curves for

items of greater difficulty (increasingly unsafe practices) are located to the right.

This multi-item graph is also the basis for defining the likelihood for each possible set of responses to the complete set of items (5 items in this illustration). For the true score marked on the graph, the vertical line intersects each of the 5 item curves at the probability of a “present” response (marked on the vertical right-hand axis). So the probability of a “present” response to item #1 is p_1 , to item #2 is p_2 , etc., and the probability of a “absent” response to item #1 is $(1 - p_1)$, to item #2 is $(1 - p_2)$, etc. With a crucial assumption that responses to the separate items are independent, the likelihood of every possible combination of responses for an individual with the true score depicted can be calculated. For instance, a response (present, absent, present, absent, absent) would have the likelihood:

$$\begin{aligned} &\text{Probability of } \{1,0,1,0,0\} \\ &= p_1 \times (1 - p_2) \times p_3 \times (1 - p_4) \times (1 - p_5) . \end{aligned}$$

Step Three: Assign an (inferred) factor score based on an individual’s responses when the individual’s true score is unknown. First, the probability of that individual’s set of responses can be calculated at each point along the true factor scale. Maximum likelihood assignment means choosing the number on the scale with the highest probability.

One important result arises from basing the score on the probability of the specific set of responses. If one item must be deleted from consideration for an individual because it cannot be recorded or data are lost, the probability for the rest of the response set can still be calculated across the true factor scale and the score assigned based on those probabilities. This is referred to as *invariance*³, with the consequence that the inclusion/exclusion of any particular item does not bias the scoring – always assuming that missing a response is not in and of itself informative.

Since the true factor score that maximizes the joint probability of the five item responses also maximizes the sum of probabilities for those responses, IRT

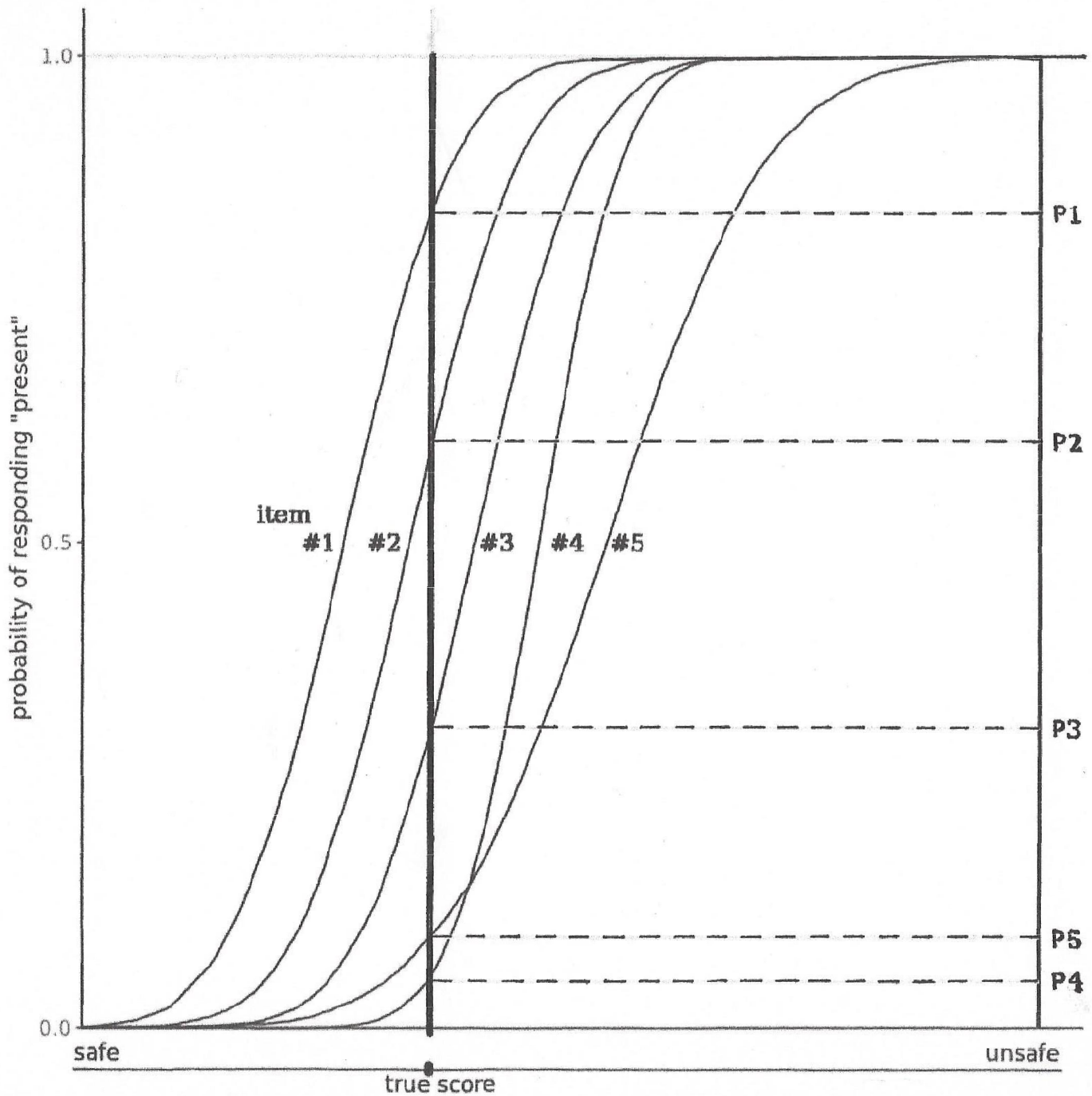
literature often refers to “summing the probabilities for the individual items.” This also leads to an alternative in scoring paradigm by using the item discrimination to weight the item probabilities, then proceeding to find the true factor score that maximizes this weighted sum.

Reality – Unknown True Factor Scale: An IRT model is self-contained in the sense that it is constructed using its own data base, i.e., responses from the individuals who are to be assigned scores. Therefore without a known True Factor Scale, defining both a scale and scores becomes a joint optimization problem. Computational approaches can involve sophisticated algorithms and be quite efficient in reaching the optimal solution.

However, it is possible to see from a more elementary optimization approach that the (optimal) solution can be attained, albeit laboriously. One such approach alternates between defining the items’ curves and scoring individuals. Consider starting from individuals’ approximated “true scores” (historical ranks could be used, even randomly assigned ranks could be used although this would be very inefficient). Assume that these scores will be fairly accurate for many individuals and erroneous for others. Based on these scores, create the items’ curves – then with these curves, re-score all the individuals. Then iterate as many times as needed, each time recalculating to obtain the items’ new curves – and once again re-scoring all the individuals. When the factor scale and the item curves stop changing, scoring cannot change and the process terminates. And both the factor scale and the individuals’ scores are determined, completing the process.

Modifications for Different Responses: If responses for some items go beyond absent/present, to include more categories or even to a continuous measure such as a rate, the concept and paradigm for constructing an IRT model do not change. But the mechanics do and these have been worked out theoretically and computationally. The roles of difficulty and discrimination do not change. For instance, to assess discrimination, look at the

**FIGURE #2:
RELATIONSHIP OF MULTIPLE ITEMS TO FACTOR SCORE**



distribution of responses at each point along the factor scale. Then compare those distributions to determine their overlap. A highly discriminating item will show relatively little overlap for nearby factor scores and almost no overlap for more distant factor scores. Difficulty can still be linked to the median score.

A Single Comprehensive Score: There are several computational strategies for calculating the single score at stage 2, but the principle illustrated above applies for combining the information in the several (six) stage 1 factor scores. Some software proceeds to model the hierarchy of fundamental

factors at both stages simultaneously; other software proceeds sequentially.

The technical differences and the computational advantages/disadvantages to these modes of solution are beyond the scope of this article. However the other challenges for modeling FMCSA data will have much greater influence on the model's success.

HOW WELL CAN AN IRT MODEL WORK FOR FMCSA?

Challenges for IRT Modeling of FMCSA Data

An IRT model and the scoring system it provides have the potential to work well for FMCSA data, with the three key advantages. First, the model can allow weighting individual items according to their abilities to discriminate all along the scale from safer to less safe. Second, scoring incurs no bias when items are inapplicable or missing for some carriers; and no imputation is made for missing responses. Third, the model is stable since it does not depend on selection of an expert or on the choice of secondary data source or reference to some other resource that could change over time. Fourth, there is no mathematical magic in constructing an IRT model, although there may be computational cleverness especially for very large data files.

To be successful the actual MIRT must satisfy the premises underlying its mathematical construction. The crucial challenges for constructing an MIRT for FMCSA data, however, lie in how the model handles heterogeneity – heterogeneity of the population and heterogeneity in the item responses.

Premises for IRT Models

An IRT model is therefore a mathematical solution that gives the best simultaneous set of item measures (discrimination and difficulty) together with scores for individuals. The mathematics require meeting several conditions.

Premise #1: The presumption underlying an IRT model is that only indirect information is available about an important factor. So the first premise is:

- Taken altogether, the available indirect information (items) gives complete information about the important factor.

The bottom line is that, regardless of its name or its intended meaning, the factor will *only* reflect the indirect information in the actual items used to define it. If new items are added without expanding the coverage of the factor, then the factor will not change and scores can be calculated with or without inclusion of these items. If however, new items are added to expand the scope of the factor, these will modify the definition of the factor.

Premise #2: Like any data-based model, an IRT model depends on the data quality. So the second premise is:

- The data (responses to items) are true, accurate and precise.

The data will be modeled whether they are correct or not; hence any systematic bias will become part of the model. If the bias is strong enough, then when those responses are subsequently corrected, the item curve might even change enough to require model recalibration. Of course, if there is a large amount of measurement error, the model might still be correct but the discrimination would be poor.

Premise #3: The structure of an IRT model is built using two attributes of each item that provides the indirect information: difficulty and discrimination. So the third premise is:

- Relative difficulty of one item is independent of whether a carrier's practices are safer or less safe; and also, difficulty is independent of any other circumstances that would vary among carriers.

In essence this requires that a response of "present" to one item must always represent "less safe" than a response of "absent" by the same or any other respondent. For a scaled response, "4" must always designate greater safety than "5." If counts are used jointly with scaled scores, "4" must be equivalent to 2 x "2."

Premise #4: IRT models reflect the relevance of each item to the underlying factor in contrast with scoring algorithms that most often weight items equally or weight items by difficulty. So the fourth premise is:

- Weights for calculating the summary statistic (final score) should depend on the degree to which each item discriminates between “safer” (lower) and “less safe” (higher) scoring carriers.

Premise #5: Scores calculated from IRT models are valid within the range of factor scores that are represented in the data base used to build the model. So the fifth premise is:

- The data base used to construct the IRT model includes carriers across the full range of “Safety Culture” and across the full range of each of the six component aspects.

While intuitively obvious, it is clear from graphing the all the curves together that at each extreme, all items have probabilities of near zero or all items have probabilities near one. (Figure 2 illustrates this at each extreme of “safe” and “unsafe.”) Therefore, distinguishing among scores on either side of the middle range becomes impossible.

Heterogeneity

When IRT models were originally created, they were predicated on the assumptions that the fundamental factor was similarly germane for all the individuals it would be applied to. It was also crucial to inclusion of an item that each possible response have a single meaning.

Thus for IRT modeling of FMCSA data, heterogeneity poses a major challenge; and whether it can be addressed satisfactorily will be a determinant of the success of the model and the scoring system.

The first step is to understand which sources of heterogeneity require attention in constructing an IRT model and to assess the magnitude of the impact. The second step is to develop an approach

to address the heterogeneity wisely. Some of the many(!) options include restricting the referent group for each carrier, for example by constructing a separate IRT model for each (large) relatively homogeneous subgroup. Other options focus on the items themselves, e.g., expanding a particular item into a set of items that separately address different subgroups or reweighting responses to an item perhaps using an exposure measure based on carrier attributes or services.

Regardless of the approach or approaches taken, validation of the factors and of the scoring system for each important subgroup is essential to ensure fairness of the scores and to give confidence in the results.

Heterogeneity of population of carriers: The motor carrier industry is extraordinarily heterogeneous and carriers provide multiple kinds of service over greatly different geographic regions and routes. An IRT – or any other data-based – model presumes homogeneity in the absence of information characterizing differences among individuals. Therefore differences in services provided (e.g., long-distance hazmat versus short-distance farm-to-market) could result in different item curves and hence in different scoring equations. On the other hand, for some aspects (e.g., Controlled Substances) the underlying factor may be essentially the same for carriers that are otherwise dissimilar.

Two immediately apparent sources of heterogeneity are the relative “exposure” of each carrier to violation based on auxiliary factors such as geographic distribution of mileage and differences among carriers of the relevance or the comparative importance of particular violations. A third source of heterogeneity is the amount of information available for each carrier and hence the precision with which each can be scored.

Heterogeneity of response information: Serious difficulties are posed when responses are anticipated to be essentially limited to “1,” “2,” or “3” for one carrier’s service type or service region while another carrier over the same time frame or

mileage can realistically incur a “4” or a “5” (e.g., wintertime traveling in the South versus the northern tier of states).

Adjustments are possible for salient differences (e.g., miles traveled in states with low versus high ratios for “speeding : exurban miles traveled”), and again, there are a variety of logically defensible approaches.⁴ These adjustments might be made at any level, i.e., in response definitions or transformations or at the first level of the MIRT model where item weights define each aspect (fundamental factor) or at second level of the MIRT model where a single overall measure is created based on the factors together. The purpose is to achieve equivalence of response meaning (as a safety item) across all responders. How successfully the model handles the response heterogeneity will be a determinant of the model’s effectiveness.

Additional Questions to Ask

- How are responses being recorded for each item whether binary, polytomous or continuous; are these scaled? In what form are the reported responses for each item entered into the model?
- How is the model being constructed so that it applies to categories of carriers and also to the complete population of carriers?
- How much information (responses to how many items and response distributions based on how many responders) must be available before a carrier can be assigned a score?
- How is the precision of each carrier’s score being quantified and quoted?
- How much impact can any single item contribute to a carrier’s score? Is there a limit?

- How is the model being vetted or validated for overall performance? How is the model being vetted or validated for performance with respect to important subgroups of carriers?
- How will model performance be monitored for anomalies once the model is put into use?
- How will scores be published? What referent group (total population or specified subgroup) will be used in publishing scores?

SUMMARY

The good news is that an IRT model has the potential to provide a stable and fair scoring system. Whether it can achieve this goal will depend on the availability of accurate relevant data on all the important aspects of “Safety Culture.” Success will also depend on how well the truly difficult challenges of the heterogeneity of carrier industry can be encompassed by the final model and scoring system. The details will be telling – until these are known and the model is fully vetted the IRT model remains a potential waiting to be realized.

ENDNOTES

1: For an MIRT (multidimensional) model, separate scores are often reported for each dimension. There are ways of combining those separate scores into a single score, but that typically occurs outside the actual model-fitting process.

2: If information is sparse or lacking at some points along the true factor scale, then the standard practice would be either to fit a smooth function to the available responses or to interpolate smoothly so that the final curve is monotone increasing.

3: Technically the term *invariance* is typically used to imply that the item parameters, the difficulty and the discrimination, stay the same regardless of which respondent is considered or which population is used to develop the model or which population is

applied to. Likewise the response parameters, and hence the score(s), for each respondent stay the same regardless of which items are administered. Application to the case of FMCSA data is considered in later sections of this article.

4: Of the wide range of options, a few examples are rescoring or rescaling responses based on auxiliary information. For instance, mileages could be separated by state or reweighted based on an exposure measure such as an index for a state's rate of issuing violations. Alternatively, responses could be relativized (actual compared expected) based on a "norm" or expectation for comparable carriers taking into account the relevant carrier attributes or transport and route patterns. At the level above responses to individual items, aspects could be weighted separately for different types of carriers or reweighted in accord with carrier attributes. It would also be possible to reweight aspects in accord with total information available, equivalent to reweighting in accord with the precision of quantification of the aspect. It would also be possible to take heterogeneity into account through score calculation, the determination of the referent group of carriers and /or by the relative risk or measure of exposure. This does not begin to exhaust the potential logical approaches, but rather to underscore the options for effectively handling heterogeneity.

REFERENCES

Hambleton, R.K., Swaminathan, H., and Rogers, H.J. (1991). *Fundamentals of Item Response Theory*, Newbury Park, California: Sage Publications, Limited.

National Academies of Sciences, Engineering and Medicine (2017). *Improving Motor Carrier Safety Measurement*, Washington, DC: National Academies Press. doi: <https://doi.org/10.17226/24818>.

van der Linden, Wim. (2018). *Handbook of Item Response Theory*, Boca Raton, Florida: CRC Press.

DISCLAIMERS AND NOTES

*- Disclaimer and Acknowledgments - The content of this article, the representation of the concepts, and views expressed herein are those of the author and should not be construed to represent those of the National Institute of Statistical Sciences.

** -This article is written about IRT methodology per se. The author is not privy to the actual modeling being done on contract to FMCSA, nor is it known how closely this modeling follows the recommendations in the National Academies of Sciences, Engineering and Medicine report (2017).

BIOGRAPHY

Nell Sedransk received her PhD in Statistics from Iowa State University. She is an Elected Fellow of the American Statistical Association, the International Statistical Institute, and the American Association for the Advancement of Science. She has coauthored three books and published research on statistical theory and application in refereed statistical, scientific and engineering journals. Following her career as professor of mathematics and statistics, she moved to National Institute of Standards and Technology as Chief of Statistical Engineering, later joining the National Institute of Statistical Sciences, ultimately becoming its third Director. E-Mail: nsedransk@niss.org

RAIL – THE LEFT-OUT SERVICE ALTERNATIVE

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ABSTRACT

The trucking industry faces a number of issues as it tries to meet growing demand for services. Trucking services are stifled by three factors: (1) strict enforcement of hours of service requirements which preclude carriers from meeting scheduled appointments; (2) over-the-road driver shortages; and (3) the absence of tort reform or federal preemption to trump nuclear judgments which reach upstream to shippers and brokers. However, rail may be an alternative for a growing number of commodities. This article examines the viability of rail services for the wine industry.

TRUCKING CHALLENGES

Many current supply chain topics center around the changing retail paradigm of internet sales, home delivery, and cut-throat competition for lower distribution costs among retailers. As covered elsewhere, promises of “free freight and free returns” with lower inventories and point of sale real estate costs is driving many retailers to a combination of (1) inbound supplier to fulfillment center models; (2) truckload outbound pools (or middle leg movements) followed by (3) last mile delivery utilizing the postal service, straight trucks, and noncommercial motor vehicles (vans or sprinters).

At the same time, long haul truckload and stop-off truckload services are stifled by three factors: (1) strict enforcement of hours of service requirements which preclude carriers from meeting scheduled appointments; (2) over-the-road driver shortages; and (3) the absence of tort reform or federal preemption to trump nuclear judgments which reach upstream to shippers and brokers.

With this supply chain turbulence comes the hope that technology and science can reduce costs and improve service. Block chain is touted as a way to ensure supply chain integrity and automate shipping and tracing driverless trucks, or at least platooning is touted as a way to reduce driver fatigue if not driver expense and carbon emissions. Yet, the highways remain congested with no durable federal or state

funding in sight. And even drones are being examined as a way to avoid highway congestion.

RAIL AS AN ALTERNATIVE

Often left out of contemporary logistics discussions is a missing piece of the puzzle – the role of rail service as a viable inbound logistics alternative.

TOFC and COFC rules have been around for 40 years. Without much direct marketing, the main line railroads with few exceptions have left marketing of intermodal rail service up to intermediaries and major truck lines offering substituted motor for rail services. Maybe now is the time to consider the future role of rail before more effort is put into developing driverless truck-trains to operate on broken down and congested highways.

For example, one of the least likely commodities to be shipped via rail car, wine from California’s wine country, found a new mode on America’s railroad lines as crude oil prices, followed by diesel prices rose dramatically in 2008. Now ten years later, there is still significant volumes moving via Intermodal rail.

Despite tight truck capacity and driver supply problem from the economic upturn; most wine still moves coast-to-coast via truck. The thought of putting precious, highly-valued wine cargo on the rail, in a boxcar, is still a rarity. While in the past, rail was considered too slow, or too hot, or too cold, or

just too much trouble. However, with diesel fuel hovering between \$ 3 and \$ 4 per gallon, rail transport still finds favor among some of California's fine wine producers. Of course, Intermodal Containers have been used previously to transport wine via rail. Likewise, box cars are more daunting in their size and sometimes troublesome loading and unloading.

Northern California's best-known wine producing area produces about 33 million cases of wine annually. Statewide the total is approximately in excess of 250 million cases! Or, an astounding nearly 3+ billion bottles.

If the winery or wine consolidator doesn't have a rail siding, loading must be done at the rail site from truck to railcar. Likewise, most wine distributors do not locate adjacent to rail sidings. So trucks are likely needed at both origin and destination; then why the switch to railcar? Fuel costs! The escalation of diesel prices has pushed the cost of moving a 53 ft. trailer from California's wine country to Florida to nearly \$6-7, 000.

A box car can hold 3 1/2 to 4 trailer loads and move the boxcar the same distance for a cost of only \$4000! Even if an added \$250-375 may be added at both origin and destination for transfer of the boxcar load, the savings are still substantial and very worthwhile! As points of reference, a boxcar can load 4,300 to 5,000 cases of wine while a 53-foot truck trailer loads about 1,235 cases.

This adds-up to other benefits also in that 4 trucks for every railcar utilized are removed from the highways, lowering congestion while saving over 2,000+ gallons of fuel the trucks would have consumed. In fact, according to the Association of American Railroads, the AAR, freight trains can, on average, move a ton of freight 436 miles on one gallon of diesel fuel. Obviously, this makes costs for movement tremendously economical, comparably speaking. Trucks move, on average 46,000 pounds of cargo around 6-7 miles on one gallon of fuel, or about 0.25 miles per gallon per ton

The most evident drawback to rail shipping is time in transit. Inventory carrying costs are minimal compared to the savings in transport costs. Now the wine can ride securely in the newer, better insulated, temperature controlled and monitored railcars. Speed-to-market does suffer when a routine inventory replacement system is in full use. Rail service to the mid-America and the east coast takes 4 to 9 days while a truck can cover the same ground in 2.5 to 5 days. Therefore, for distances over 500 miles, rail just makes sound economic sense.

Kendall-Jackson and The Jackson Family wines are major supporters of rail shipping. Gallo wine group has been involved in rail shipping for over 85 years in some form or other. Gallo dates to the days when wine was bulk shipped in casks and barrels, so their history covers lots of shipping innovations. Today they use insulated boxcars, shipping over 12,000 of these annually. These cars are very effective in controlling heat and cold temperature swings.

Other wineries and consolidators are still skeptical, pointing out that rail service and tracking and tracing has been unreliable for years. Some are true believers that nothing can protect and transport their fine wines better than refrigerated truck trailers. And, that until a train can make the journey to Texas in a day & a half, or to Chicago in two, trucks will remain the mode of choice.

Clearly, increased tracing technologies and economies of rail service for volume shipments should encourage third party consolidation by freight forwarders or consolidators.

That can work for a number of wineries. Their job is to bring wines from the various winery locations together for final shipment to distributors, who can be independently-owned companies or state-owned ANC distribution centers. The consolidator usually can choose the shipment mode and exists to get the best service at the best price and lowest cost for the wineries he represents. So rail, when it meets the service requirements of the wineries and their customers is a cost-effective choice

One “wine consolidator”, based in Napa, reports that he moves about 30 million cases of wine annually, about 25% by rail. In 1998 his company loaded about 100 railcars yearly. This year he will load over 5,500 railcars+. His company invested their own money to build the spur line from the short-line railroad that connects Northern California to the long-line rail route to the East. This reduced the costs of loading and transfer of the cases from the wineries to the warehouse to the railcar.

Time, innovations and economic conditions will tell as to the real potential for increased rail boxcar and COFC shipments. However, as long as diesel fuel is costly and truck capacity is tight as it is today, look for more and more of heavy long distance shipments to be consolidated to ride the rails.

I believe the above chart is viable for long distance deliveries, particularly for wine and other heavy shipments. Also, rail is up to the task for the following reasons:

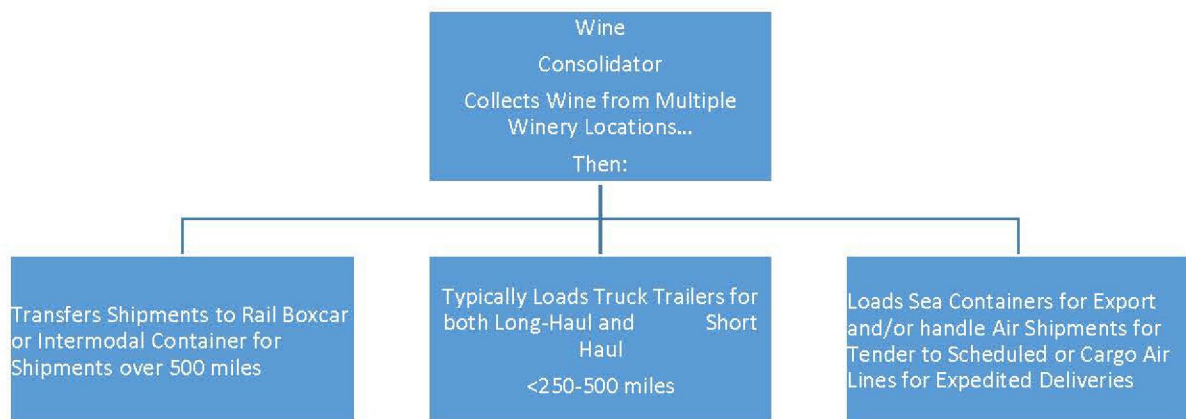
1. Class 1 railroads make private investments to improve infrastructure and buy new equipment totaling a staggering \$25 billion annually.
2. Railroads offer competitive advantage over trucks for moving millions of truckload shipments per day from otherwise congested highways.
3. Railroads “continue to invest, develop innovative new products, and serve [their] customers’ most critical supply chain needs.”

Clearly the privately funded rail alternative to long distance trucking service offers economies of scale, conserves energy, and removes wear and tear from deteriorating highway systems.¹

(Footnotes)

¹ “Railroads Power . . . U.S. Economies” by Hamberger and O ’Malley, Guest Columnists at Tennessean.com 1/2/19 at p. 11A.

FIGURE 1
VIABLE RAIL DELIVERIES



BIOGRAPHY

Charles W. (Chuck) Clowdis has nearly five decades of experience in the transportation, supply chain and logistics fields covering all modes: air cargo, barge, drayage, inland port operations, motor carriers, port operations, private fleets, railroad and rail intermodal, and third-party logistics. He has provided best practice consultancy in the areas of administration, interim management, operations, sales & marketing, and related activities. His clients include both service providers and buyers of those services. Clowdis also serves as both a testifying and non-testifying expert opinion witness in litigation matters. He has testified in federal, state and government administrative tribunals, working directly with clients as well as attorneys. His career includes progressively more responsible executive positions with several motor carriers, nearly three decades associated with the National Transportation Practice, at Ernst & Young; and nearly ten years as Managing Director-Transportation with IHS/Global Insight, the economics, data research and consultancy. In December, 2017 he formed Trans-Logistics Group, Inc. to offer consulting and litigation services to select clients throughout North America. He holds degrees from Young Harris College and The University of Georgia and was Chairman and President of the American Trucking Associations' Sales & Marketing Council. He prepared two books for the ATA and published nearly two hundred articles and white-papers. E-Mail: chuckclowdis@aol.com

PRECLUDING DISCOVERY OF PREVENTABILITY DETERMINATIONS IN TRUCKING ACCIDENTS

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ABSTRACT

The discoverability and admissibility of post-accident “preventability” determinations by trucking companies is often much disputed in truck accident cases. It is well known that Plaintiff’s attorneys will try to construe a trucking company’s classification of an accident as “preventable” as an admission of fault during the course of a lawsuit. However, statements made by the FMCSA provide significant support to a trucking company’s efforts to preclude discovery or admission of preventability determinations in a lawsuit. This article explores these issues.

INTRODUCTION

The discoverability and admissibility of post-accident “preventability” determinations by trucking companies is often much disputed in truck accident cases. It is well known that Plaintiff’s attorneys will try to construe a trucking company’s classification of an accident as “preventable” as an admission of fault during the course of a lawsuit. Over the years, courts have reached conflicting results as to whether preventability determinations should be discoverable or admissible at trial. This article provides an overview of the case law and provides strategy for handling “preventability” determinations in your case.

There are many standards by which an accident is determined to be preventable floating around the transportation industry. For example, 49 CFR 385.3 defines a “preventable accident” as an accident:

- (1) that involved a commercial motor vehicle, and
- (2) that could have been averted but for an act, or failure to act, by the motor carrier or the driver.

Although another party may have been the primary cause of the accident, most preventability standards focus solely on whether the accident could have been avoided by the truck driver, while ignoring the negligence of others. Of crucial importance, these preventability standards do not evaluate whether the truck driver acted reasonably or with ordinary care.

What may be a surprise to some motor carriers is the fact that motor carriers are not required to do preventability determinations since the accident reporting requirements for motor carriers under FMCSR Part 394 were rescinded on March 4, 1993. However, the practice remains seemingly entrenched in the industry. Somewhat confusing for motor carriers is that FMCSA still does preventability determinations when analyzing whether a motor carrier had a satisfactory safety rating under FMCSR § 385.17. As discussed further below, the FMCSA also implemented on August 1, 2017 a crash preventability program expected to run to at least August 1, 2019.

In recent years, courts have reached conflicting results as to whether preventability determinations should be discoverable or admissible at trial. Courts often found preventability determinations **discoverable**, but not necessarily **admissible**. However, this approach often unfairly puts the motor carrier in the position during the discovery

process of having to explain its actions during its post-accident review of an accident.

Whether a preventability determination is discoverable often depended in large part on how the determination was created. If a preventability determination was conducted in a companies' ordinary course of business, the determination was often discoverable. Most legal arguments focused on whether preventability determinations are relevant, confusing, misleading, a subsequent remedial measure, or protected under the work product doctrine. Following is a summary of the outcomes of the cases under the various legal theories:

- **Proportional to the Needs of the Case** (Fed. R. Civ. Proc. 26):
 - *Head v. Disttech, LLC*, 2017 WL 3917065 (W.D. Wash. Sept. 7, 2017) (admissible)
- **Relevance** (Fed. R. Evid. 401, 402):
 - *Rogge v. Estes Exp. Lines*, 3:13CV1227, 2014 WL 5824766, at *2 (N.D. Ohio Nov. 10, 2014) (inadmissible)
 - *Nix v. Holbrook*, 2015 WL 733778 (U.S. D. S.C. Feb. 20, 2015) (discoverable)
- **Confusion / Misleading / Danger of Unfair Prejudice** (Fed. R. Evid. 403):
 - *Chavez v. Marten Transp., Ltd.*, 2012 WL 12861607, at *1 (D.N.M. May 2, 2012) (admissible)
 - *Brossette v. Swift Transp. Co., Inc.*, 2008 WL 4809651, at *3 (W.D. La. Oct. 30, 2008) (admissible)
 - *Cockerline v. Clark*, 2013 WL 5539064 (N.J. Super. Ct. App. Div. Oct. 9, 2013) (inadmissible)
 - *Inman v. Sacramento Regional Transit Dist.*, 2003 WL 1611214 (Cal. 3rd Dist. Mar. 23, 2003) (inadmissible)
 - *Villalba v. Consol. Freightways Corp. of Delaware*, 2000 WL 1154073 (N.D. Ill. Aug. 14, 2000) (inadmissible)

- **Materials Prepared in Anticipation of Litigation & Attorney Work Product Doctrine vs. Ordinary Course of Business** (Fed. R. Proc. 26(b)(3)):

- *Head v. Disttech, LLC*, 2017 WL 3917065 (W.D. Wash. Sept. 7, 2017) (discoverable)
- *Laws v. Stevens Transport*, 2013 WL 941435 (S.D. Ohio 2013) (discoverable)
- *Byrd v. Wal-Mart Transp., LLC*, 2009 WL 3055303, at *3 (S.D. Ga. Sept. 23, 2009) (discoverable)
- *Heartland Express, Inc., of Iowa v. Torres*, 90 So. 3d 365, 367 (Fla. Dist. Ct. App. 2012) (not discoverable)

- **Subsequent Remedial Measure** (Fed. R. Evid. 701):

- *Harper v. Griggs*, 2006 WL 2604663 (W.D. Ky. Sept 11, 2006) (inadmissible)
- *Venator v. Interstate Res., Inc.*, 2015 WL 6555438 (S.D.G.A. Oct. 29 2015) (discoverable)
- *Martel v. Massachusetts Bay Transp. Auth.*, 525 N.E.2d 662 (Ma. 1988) (inadmissible)

- **49 U.S.C. § 504(f):**

- *Tyson v. Old Dominion Freight Line, Inc.*, 608 S.E.2d 266 (Ga. App. 2004) (discoverable)
- *Sajda v. Brewton*, 265 F.R.D. 334 (N.D. Ind. 2009) (discoverable)

It has been seldom litigated whether such preventability determinations should be precluded from discovery under 49 U.S.C. § 504(f), which provides:

- “No part of a report of an accident occurring in operations of a motor carrier, motor carrier of migrant workers, or motor private carrier and **required by** the Secretary [of

Transportation], and no part of a report of an investigation of the accident **made by** the Secretary [of Transportation], may be admitted into evidence or used in a civil action for damages related to a matter mentioned in the report or investigation.”

In *Sajda v. Brewton*, 265 F.R.D. 334 (N.D. Ind. 2009) defendants successfully argued that 49 U.S.C. § 504(f) barred a motor carrier’s accident register from disclosure in discovery because it is a “required” accident report under FMCSR § 390.15. The *Sajda* court, however, did not extend 49 U.S.C. § 504(f)’s application to “regularly-gathered information that the carrier acquires . . . used to generate the DOT Official Accident Register Reports,” such as preventability determinations.

The result in the *Sajda* case is perhaps understandable because since 1993 preventability determinations were not regarded as accident reports “required” by the motor carrier to complete for the FMCSA. Because motor carriers are not technically required to do preventability determinations pursuant to FMCSR Part 394, 49 USC § 504(f) arguably had no application to the preventability reports done by motor carriers. Nevertheless, 49 USC § 504(f) still applied to preventability determinations “made by” the FMCSA.

However, the FMCSA’s recent adoption of the crash preventability program perhaps breathes new life into the argument that 49 USC § 504(f) affords a statutory basis to keep preventability determinations out of civil lawsuits. On August 1, 2017, the FMCSA implemented the crash preventability program expected to run to at least August 1, 2019. See <https://www.fmcsa.dot.gov/safety/crash-preventability-demonstration-program>. The crash preventability determinations made by the FMCSA under this program to a select few types of accidents do not affect any carrier’s safety rating or ability to operate, but rather

are simply noted (but not removed) on the FMCSA’s Safety Measurement System (SMS). In announcing the program, the FMCSA published the following in the Federal Register:

- “In response to the [FMCSA]’s proposal to remove not preventable crashes from the public SMS display, commenters correctly stated that the [FMCSA] was equating a finding of “not preventable” with a finding of “not at fault.” Advocates stated that determinations of fault are “the province of the legal system” and noted that independent investigations of a crash may reach different fault conclusions. Advocates advised that using “only a limited amount of information about the incident, and without all of the benefits provided to a jury during a civil trial, including going to the scene, is grossly misguided.” The TSC added that the State court systems are responsible for making determinations of fault. ATA advised that, “The goal of this process should not be to definitely declare fault, but to identify the predictive value of crashes in the same way the agency does with violations.”
- Fault is generally determined in the course of civil or criminal proceedings and results in the assignment of legal liability for the consequences of a crash. By contrast, a preventability determination seeks to identify the root causes for a crash and is used to prevent the same type of crash from reoccurring. A preventability determination is not a proceeding to assign legal liability for a crash. Because preventability determinations are distinct from findings of fault, Section 5223 does not prohibit the public display of not preventable crashes.
- The demonstration program is intended to analyze preventability. The [FMCSA] believes that the public display of all crashes, regardless of the preventability determination, provides the most complete information

regarding a motor carrier's safety performance record. The [FMCSA] is committed to the open and transparent reporting of safety performance data.

...
· **Under 49 U.S.C. 504(f), "No part of a report of an accident occurring in operations of a motor carrier, motor carrier of migrant workers, or motor private carrier and required by the Secretary, and no part of a report of an investigation of the accident made by the Secretary, may be admitted into evidence or used in a civil action for damages related to a matter mentioned in the report or investigation." The crash preventability determinations made under this program are intended only for FMCSA's use in determining whether the program may improve the Agency's prioritization tools. These determinations are made on the basis of information available to FMCSA at the time of the determination and are not appropriate for use by private parties in civil litigation. These determinations do not establish fault or negligence by any party and are made by persons with no personal knowledge of the crash.**

Federal Register - Vol. 82, No. 143, July 27, 2017.
In early 2018, the FMCSA reiterated:

· These determinations are made on the basis of information available to FMCSA at the time of the determination and are not appropriate for use by private parties in civil litigation. These determinations do not establish fault or negligence by any party and are made by persons with no personal knowledge of the crash.

Federal Register - Vol. 83, No. 26 /
Wednesday, February 7, 2018.

Clearly, the above statements made by the FMCSA provide significant support to a trucking company's efforts to preclude discovery or admission of preventability determinations in a lawsuit. The FMCSA's statements show how a preventability determination is irrelevant, confusing, and misleading. Further, if the preventability determination is made by the FMCSA it should not be discoverable or admissible under 49 U.S.C. 504(f). Further, motor carriers participating in FMCSA's newly implemented crash preventability program should argue that 49 U.S.C. § 504(f) precludes both the discoverability and admissibility of preventability determinations made by the FMCSA through this program.

BIOGRAPHY

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REPRINT

SAFETY FITNESS DETERMINATIONS: WHAT IS FMCSA MEASURING?

Big Data and Regulatory “Improv” are Drowning Due Process¹ (Endnotes)

Mark J. Andrews
Clark Hill Strasburger

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BACKGROUND

This article reports on a topic assigned to a recent legal conference panel that discussed safety fitness determinations for motor carriers. The assigned topic, while focusing on safety fitness determinations, big data, and due process begs the question of whether the Federal Motor Carrier Safety Administration (FMCSA or the Agency) is measuring anything that’s really relevant to the “safety” or “fitness” of a motor carrier of passengers or property to operate on the Nation’s highways. Even if FMCSA *thinks* it is measuring safety or fitness, the more important question is whether those measurements are accurate or fair. We submit that the successive efforts of FMCSA and its predecessor agencies to measure safety and fitness based on mass quantities of roadside inspection data are incapable of either accuracy or fairness. This is true of the methodology known as Compliance, Safety, Responsibility (CSA) and was true of its SAFESTAT predecessor before 2010. The same will be true if FMCSA ever tries to implement the recommendations of the National Academies of Sciences (NAS) for vastly expanded data collection as envisioned in the Item Response Theory (IRT).

Those three methodologies share the following flaws:

- the “big data” gathered is “bad data” for comparison purposes, because of the patchwork of performance standards used by law enforcement in 50 States;
- this “big data” is paradoxically not “big enough” due to the small sample sizes typically gathered for small carriers; and

- FMCSA has no track record of consistency or competence in managing and analyzing “big data” as part of its current programs, let alone in handling the mathematical complexities that would be inherent in IRT analysis.

The Agency’s history of data mismanagement has been well-documented in the context of the Safety Measurement System (SMS) developed under CSA. But if we look beyond past history with SMS, the same problems threaten to cripple the Agency’s future response to other regulatory issues in the supply chain. FMCSA is still struggling with the basic task of writing computer code to support the Unified Registration System (URS) it unveiled as a “final rule” in 2013. It has yet to comply with literally dozens of mandates under the Fixing America’s Surface Transportation Act, Pub.L. 114-94 (FAST Act) for procedural reform in areas that include but are not limited to SMS. Thus it is ill-equipped to analyze emerging regulatory issues ranging from crash preventability to the safety of “last mile” delivery operators. Instead, the Agency too often flounders from one issue to the next, substituting evanescent “guidance” for predictable rules. These issues of poor data quality, small sample sizes, data mismanagement, institutional “innumeracy” (look it up) and regulatory improvisation pose existential threats to administrative due process, as will be developed in more detail below.

ANALYSIS OF THE ISSUE

By now an ample body of evidence has been presented to FMCSA, to the United States Department of Transportation (USDOT) and to Congress regarding the defects of SAFESTAT and

SMS methodology.² This evidence comes from federal watchdog agencies, from academic studies and even from NAS in its review of SMS under the FAST Act. The major shortcomings of roadside inspections as a surrogate for safety fitness are detailed in Attachment 1.

Those shortcomings include:

- State by state disparities in safety enforcement policies mean that SMS scores largely depend on where a carrier operates, not on the inherent safety of those operations.
- The Governmental Accountability Office (GAO) has stated that the roadside inspections undergone by small motor carriers typically fail to yield sufficient sample sizes to reflect the overall safety of such fleets over time.
- The “law of large numbers” ensures that an occasional bad inspection will cause much more severe fluctuations in the SMS score for a small fleet than for a larger one.
- The impact of a bad inspection is magnified by widespread under-reporting of “clean” inspections.
- The Agency’s 800-plus “enhancements” of SMS methodology since its launch in 2010 detract from the predictability and usefulness of its performance standards, and have ignored established procedures for due process in rulemaking.
- Most importantly, the percentile scores generated by SMS from roadside inspection data fail to predict the actual crash history of individual motor carriers. Numerous crash-free carriers within the artificial peer groupings created under SMS suffer from guilt by association due to “averaging of averages” with regard to aggregate performance levels.

Bigger Data ≠ Better Data

Although the NAS report recognizes many of the SMS statistical problems described above, its proposed solution is essentially “more of the same.” The proposed IRT model would vastly expand the amount, type and complexity of data gathered from motor carriers, to include competitively sensitive data such

as method and amount of compensation, type of cargo transported, and driver turnover. The additional costs of gathering and analyzing such additional data are likely to be compounded by industry resistance to providing it in the first place.

In addition, fundamental legal issues are raised by two recommendations in the NAS Report (at p.5), to the effect that an IRT model should “allow for the addition of new safety measures as they become available, without having to start from scratch” and should “adapt to changes in safety over time.” These recommendations would exacerbate the worst feature of SMS from a due-process standpoint – the constantly moving targets resulting from its endless “enhancements” of the scoring system. With or without the IRT overlay, SMS cannot become the basis for definitive safety fitness determinations as long as its criteria are subject to constant revision without prior notice and opportunity for comment. While it may be understandable that the statisticians authoring the NAS report were not aware of the due process requirements for making and changing rules under the Administrative Procedure Act, FMCSA has no such excuse.

Can FMCSA Handle Big Data?

When FMCSA requested public comments on the NAS report last year, it targeted a December 2017 release date for a “Corrective Action Plan” in response to NAS. At this writing in April 2018, we’re still waiting – but this is not surprising. With due respect and regret, it must be said that FMCSA is barely able to maintain the data bases and IT systems supporting its current activities, let alone address the complexities or IRT.

The five-year debacle that is URS already has been mentioned. In 2017, two federal watchdogs renewed their criticisms of data management by FMCSA. The USDOT Inspector General stated in Report No. ST2017065 (July 25, 2017) that the Agency needed “to address its quality assurance processes and compliance review data limitations.” Similarly, a GAO report (No. GAO-17-488, July 13, 2017) called on FMCSA to modernize legacy IT systems, including development of “well-defined goals, strategies, measures and timelines.” More recently, the Agency’s

online registry of certified medical examiners for drivers was hacked on December 1, 2017 and remained out of service more than three months later (Transport Topics, March 19, 2018, pp. 1, 47). Perhaps it is time for FMCSA to borrow IT staff from sister agencies such as the Bureau of Transportation Statistics in order to upgrade its data management.

The above background casts serious doubt on the feasibility of implementing the abstruse IRT model. In all likelihood, that model would turn out to be an even costlier and more data-intensive version of SMS. Considering that SMS is still riddled with statistical, logical and legal defects after eight years of “enhancements,” adding an IRT overlay would amount to throwing good money after bad. Isn’t it time for FMCSA to consider alternative ways of fulfilling the statutory mandate (see 49 U.S.C. § 31144(a)) that actual safety fitness determinations be assigned to all 532,000 truck and bus fleets it regulates? One such alternative would be to expand desktop audits, now used by FMCSA for “new entrant” carriers, into a fee-based program linked to the periodic MCS-150 updates now required for all fleets. Details of this proposal, including follow-up site visits as warranted, have been spelled out for FMCSA in comments repeatedly filed for coalitions represented by myself and Henry Seaton, whose contributions to the analysis underlying this paper have been significant and are valued by the co-authors of this article.

CONCLUSION: BEYOND SMS, NAS, IRT AND THE FAST ACT

FMCSA’s unfinished business under the FAST Act is not limited to dealing with the NAS report. Wholly aside from the FAST Act mandates still facing FMCSA with regard to safety fitness issues and administrative procedures generally, the industry is facing many other regulatory challenges necessitating improved IT and data management at FMCSA. These issues include:

- Misuse of flawed SMS data by the plaintiffs’ bar in accident cases.
- Crash “preventability” determinations in FMCSA mini-trials.

- How to regulate the safety of “last mile” deliveries, especially in vehicles too small for coverage under FMCSA safety regulations.
- How the hours-of-service regulations in 49 C.F.R. Part 395 might be adapted to take account of emerging research on fatigue management.
- Whether and how to modify Part 395 in view of the increasing economic toll of vehicle detention and the onset of electronic logging.
- Whether the emerging issue of salvage for food shipments should be jointly addressed by FMCSA and the Food & Drug Administration (FDA) in view of shipper claims that the “actual loss” standards of the Carmack Amendment (49 U.S.C. § 14706) are changed by “adulteration” provisions in new FDA regulations on sanitary food transportation (21 C.F.R. Part 1).
- And finally, how to reform FMCSA procedures to allow independent administrative review of safety fitness determinations to at least the extent now available for civil penalties with less severe commercial impacts.

Attachment 1:

Excerpt from Comments of MCRR Coalition in Docket FMCSA-2017-0226

¹ Editor’s Note

— This article is written in a law review style and advocates a particular position as is common in law review articles. The article has been formatted for the journal’s style but the references are not in JTM’s typical style. The Journal does not take a position on the points made by the author.

BIOGRAPHIES

Mark J. Andrews has practiced law in Washington, D.C. since his admission to the District of Columbia bar in 1970. He became the Partner-in-Charge for the Washington, D.C. office of Dallas-based Strasburger & Price, LLP when that office was opened on October 1, 2001, and recently became a Member of Clark Hill PLC when that law firm and the Strasburger firm completed a combination. Among other things, Mark assists clients in resolving conflicts between U.S. federal and state laws; complying with U.S. federal licensing and safety rules for surface, air and ocean carriers; obtaining regulatory clearances for transportation mergers and acquisitions, and drafting and negotiating complex agreements for management of U.S. domestic and international supply chains. A holder of undergraduate and law degrees from Harvard University, Mark is a past co-chair of the International Transportation Committee within the American Bar Association's Section of International Law, a past President of the Transportation Lawyers Association, a recipient of that association's Lifetime Achievement Award, and an elected member of the American Law Institute. E-Mail: mark.andrews@clarkhillstrasburger.com.

Henry E. Seaton has practiced law for 44 years with the Law Office of Seaton & Husk, LP in the Washington D.C. area representing motor carriers and brokers. The firm specializes in freight claims, freight charge collection, contracting issues, carrier representation before the FMCSA and bankruptcy issues. He serves as counsel for the National Association of Small Trucking Companies, the Air & Expedited Motor Carriers Association, The Expedite Alliance of North America, the Tennessee Motor Coach Association, the American Home Furnishings Alliance and the Auto Haulers Association of America. Mr. Seaton is a member of the Conference of Freight Counsel. He is a frequent speaker and lecturer regarding cargo claims, freight charges, contracting and risk/insurance issues affecting carriers and brokers. Mr. Seaton serves on the Editorial Board for the Airforwarders Association Quarterly Magazine. A graduate of Duke University and Vanderbilt School of Law, he has published "Rules of the Road: A Practical Guide to Legal Issues in Truck Transportation" (2016) which is available for purchase at www.transportationlaw.net. In 2014, Mr. Seaton was awarded the Lifetime Achievement Award from the Transportation Lawyers Association. Email: heseaton@aol.com.

ATTACHMENT 1

BEFORE THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION WASHINGTON, D.C.

Docket No. FMCSA-2017-0226

Fixing America's Surface Transportation Act Correlation Study

COMMENTS AND AFFIDAVITS OF THE MOTOR CARRIER REGULATORY REFORM (MCRR) COALITION, INCLUDING

Air & Expedited Motor Carrier Association (AEMCA)

Alliance for Safe, Efficient and Competitive Truck Transportation (ASECTT)

American Home Furnishings Alliance (AHFA) / Specialized Furniture Carriers

Apex Capital Corp.

Auto Haulers Association of America (AHAA)

National Association of Small Trucking Companies (NASTC)

Tennessee Motor Coach Association (TMCA)

The Expedite Alliance of North America (TEANA)

Transportation and Logistics Council (TLC)

Transportation Loss Prevention & Security Association (TLP&SA)

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Date Due and Filed: September 27, 2017

IV. Responses to Federal Register notice

In the following discussion, Commenters will address the NAS recommendations set out in the Agency's August 28 Federal Register notice. In doing so, Commenters will point out that no corrective action plan can be confined to these recommendations in light of the analysis of the FAST Act and the limitations of the systemically flawed SMS.

A. Recommendation 1 – Item Response Theory Model

Systemic flaws that undermine SMS methodology would plague *any* statistical model based on the same data – even the NAS panel’s proposed IRT approach

After spending 10 years in its development, FMCSA has made more than 800 changes to its safety weighting procedures and its convoluted algorithms in an effort to “improve” the accuracy of its system. Yet the Agency has failed to address systemic flaws that Commenters have consistently presented but that have been ignored.

The NAS Report expresses a belief that introducing more types of data and using a more rigorous mathematical formula to interpret and normalize the data will result in more accurate and reliable scoring among the carriers than is currently available under SMS. In particular, Chapter 2 of the NAS Report acknowledges many current deficiencies of SMS and concedes that most of them are not readily fixed. The report fails to recognize, however, that similar flaws would pervade its proposed IRT model, which would try to predict crash risk by crunching even more gargantuan amounts of data using algorithms even more complex than those of SMS.

Although the MCRR Coalition will not explore the systemic flaws of SMS in detail at this point, we believe a brief recap is necessary to show issues not fully addressed in the NAS Report’s support of the IRT Model. As we have established in previous submissions to FMCSA¹, SMS suffers from at least seven systemic flaws:

- Insufficient data
- The law of small numbers
- Misuse of average crash rates
- Misuse of crash data
- State-by-State enforcement inconsistencies
- Peer group creep
- Profiling
- Enforcement biases

Insufficient Data

Although FMCSA has now withdrawn its misguided SFD Proposal, it bears noting that the Agency in that docket could identify a mere 262 carriers as unfit using data alone. The principal reason is that there simply isn’t enough data to establish reliable metrics on the vast majority of motor carriers.

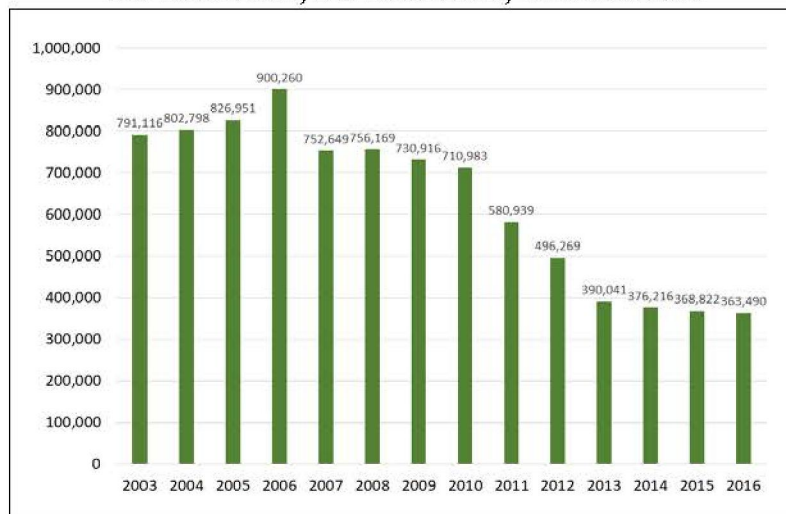
Evidence of insufficient data is extensive, but just a few points will suffice here: Based on our analysis of the 24-month SMS snapshot for August 2017, among the 532,000 active U.S. interstate motor carriers:

- 39.6% had no inspections
- Just 7.5% had 20 or more *total* inspections – the minimum threshold of data sufficiency recommended by GAO for *individual* BASICs
- 83.7% do not have the minimum number of inspections with violations to be considered in *any* of the five public SMS BASICs even under FMCSA’s inadequate data sufficiency thresholds²

The Driver Fitness and Controlled Substances/Alcohol BASICs each capture fewer than 1 percent of active U.S. motor carriers. Meanwhile, the Unsafe Driving and Hours-of-Service Compliance BASICs have seen and will continue to see major declines in data sufficiency. The Unsafe Driving BASIC suffers from the huge decline over the past decade in traffic enforcement (“TE”) inspections, which are the sole source of data for this BASIC. As seen in Figure APP-1 these inspections peaked in 2006 and have since dropped 59.6%. TE inspections are down 37.4% since the year FMCSA implemented CSA. The drop in TE inspections has leveled off, but there are no signs of a rebound.

Likewise, the growth in popularity of electronic logging among larger carriers apparently has starved the HOS Compliance BASIC of many data points previously collected at roadside, and this trend should become even more pronounced once the electronic logging device mandate is fully

FIGURE APP-1
TRAFFIC ENFORCEMENT INSPECTIONS
CY 2003-2005, FY 2006-2016, U.S. Carriers



Source: Program Effectiveness Report, FY 2011 and FMCSA data at A&I Online

implemented. The ELD mandate could help correct a different systemic flaw in SMS – enforcement bias – and of course should improve compliance with the HOS regulations. But it could also render the HOS Compliance BASIC obsolete.

Given these trends, even under FMCSA’s clearly inadequate current standards of data sufficiency, the Vehicle Maintenance BASIC – in which just 12% of carriers meet the minimum threshold – could become the only BASIC with anything remotely approaching a meaningful amount of data, albeit with a preponderance of low-value violations. (See “Enforcement biases” below.) However, applying the data sufficiency standard recommended by GAO, SMS basically disappears except, arguably, as a tool for monitoring large carriers. This is a systemic flaw that FMCSA is powerless to rectify and that would plague any statistical model.

Law of Small Numbers

The law of small numbers is in large part a function of data insufficiency. As has been widely recognized, SMS metrics become extremely volatile as the

number of data points drops. This is the same phenomenon – small sample size – that leads baseball fans to pay little attention to early-season batting averages. As noted above, GAO concluded that SMS metrics could be reliable only at a higher data sufficiency standard of at least 20 observations.

Although the NAS Report does not refer explicitly to the law of small numbers, it is quite clear regarding the impact of the phenomenon. We quote the following again for emphasis:

There is no getting around the point that providing BASIC measures to carriers that have very infrequent inspections will result in highly variable assessments of such carriers. This is simply because not much is known about the frequency of violations for small carriers. Such high variance measures can result in mischaracterizing the nature of a carrier—the high variability could result in the carrier being given alerts more or less often than what would be warranted given its behavior. On the other hand, the industry is highly skewed, being comprised of a very large number of small carriers. If the data

sufficiency standards were raised, a high percentage of the industry would be excluded from measurement by SMS and therefore monitoring by FMCSA. We believe that this issue should be further investigated. (NAS Report, p. 46)

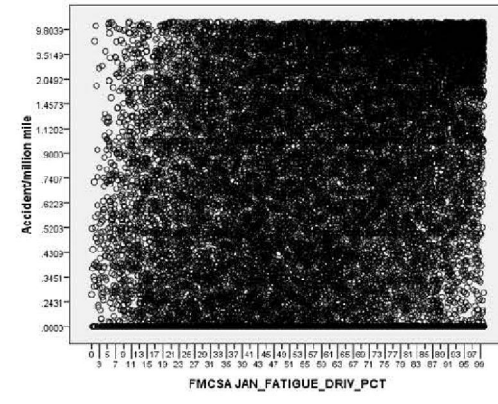
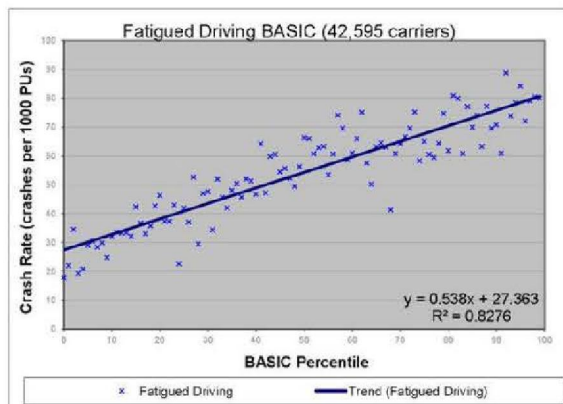
But while the NAS Report recognizes the law of small numbers and acknowledges GAO’s argument on data sufficiency, it basically passes the buck to FMCSA to make a policy decision and argues that the IRT model “will have some ability to reduce the variance of these measures through the use of smoothing with the measures of a carrier’s peers.” NAS Report, p. 46

Commenters submit that “some ability” to reduce variances is hardly a fix for this systemic flaw, which cannot be merely shrugged off given its impact on small carriers and the NAS panel’s inability to identify the new data to be surveyed, let alone its quantity or its predictive accuracy.

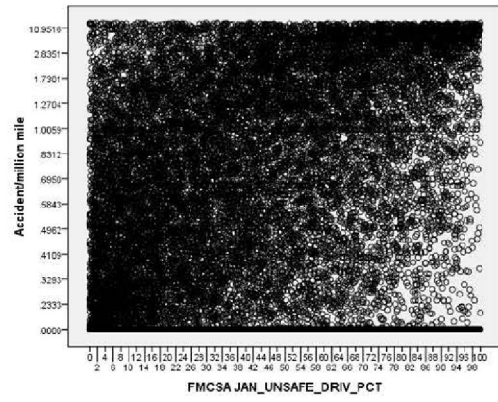
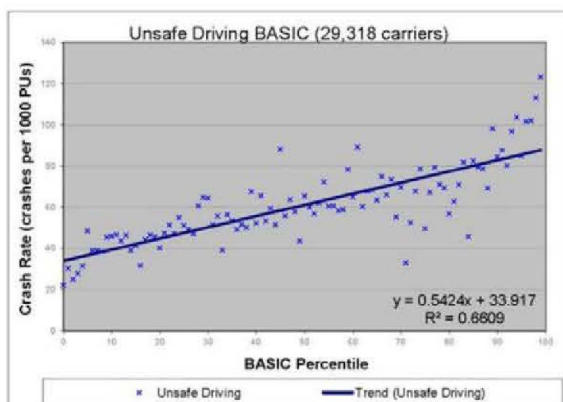
Misuse of Average Crash Rates

A similar problem relates to how FMCSA misuses the data in formulating regulatory and enforcement policy. Our Coalition has consistently challenged the Agency’s use of *average* carrier performance to make sweeping claims that do not describe the reality of *individual* carriers. We submitted the following graphs (Figure APP-2) as part of our comments filed in July 2012 in Docket No.

FIGURE APP-2
FMCSA REGRESSION OF AVERAGES – FATIGUED DRIVING PLOT OF 35,933 CARRIERS – FATIGUED DRIVING



FMCSA REGRESSION OF AVERAGES – UNSAFE DRIVING PLOT OF 35,933 CARRIERS – UNSAFE DRIVING



FMCSA-2012-0074 and again in May 2016 in response to the SFD Proposal (Docket No. FMCSA-2015-0001). These graphs show FMCSA's regression of average crash rates for carriers in the Fatigued Driving (now HOS Compliance) and Unsafe Driving BASICS compared to a plot of the individual carriers' crash rates.

The upshot is that SMS is not remotely predictive of individual carriers' safety performance where it matters most – i.e., crashes. As discussed earlier, this flaw lies at the very heart of what Congress wanted to address in the NAS correlation study. Both the Agency and the NAS panel have been presented with this study and have not addressed the issue. In fact, in their response to the Agency's NPRM in 2016, Commenters demonstrated this regression of averages when applied to peer group percentiles misidentified 53% of profiled carriers who had no crashes during the review period as “bad actors” warranting unfit ratings.

Crash Data

The SMS structure traditionally has depended upon counting all reported accidents without any scrubbing for “preventability,” let alone for causation or – even more appropriate – for absence of carrier compliance with safety regulations resulting in causation. DataQ simply does not work since the Agency insists on publishing data under a “presumed guilty until proven innocent” basis. And it does not determine causation, nor can it at less than prohibitive cost. The light scrubbing the Agency now offers for preventability determinations – in very limited scenarios as part of its two-year pilot program – cannot possibly offer a remedy for small carriers unlucky enough to be caught up in accidents that were not their fault.

Multiple studies have shown that most fatal car-truck crashes are not the result of actions by the commercial motor vehicle driver.³ FMCSA's annual Large Truck and Bus Crash Facts publication consistently shows essentially the same breakdowns with around 84% to 86% of passenger vehicle

drivers being cited for driver factors and only 26% to 35% of truck drivers cited with driver factors.⁴

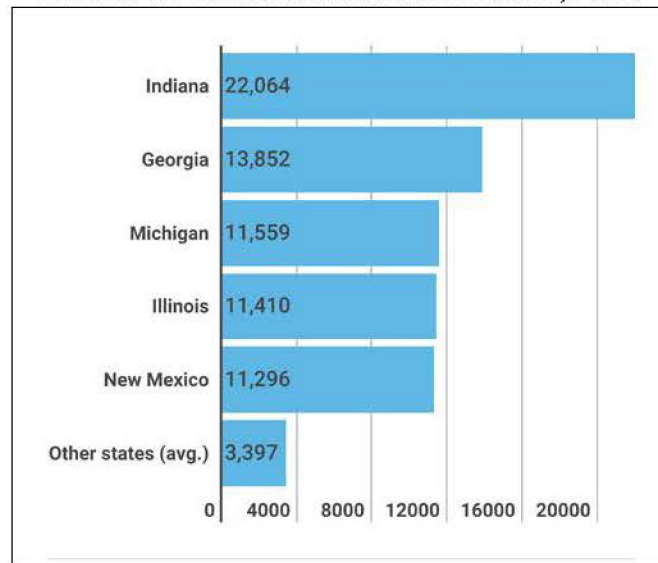
Regarding crash preventability, the NAS Report is equivocal. It lists (at pp. 48-50) several factors that would complicate a proposal to set aside non-preventable crashes. On the other hand, the report acknowledges that including non-preventable crashes is potentially misleading because any carrier placed in the same situation would have crashed, meaning that the crash is simply a consequence of circumstances, not carrier or driver misdeed. “This is an important issue, especially for small carriers, since such events can be extremely damaging, possibly putting some small carriers out of business.” NAS Report, p. 48. As is evidenced elsewhere in the report, the NAS panel seems willing to shrug off the problem, and live with a system that it acknowledges is grossly unfair to small carriers.

Inconsistent Enforcement

A system that compares carriers operating under different state regimes cannot be justified, particularly when the evidence shows significant variation in enforcement prerogatives by state. For example, commenters have long demonstrated that enforcement anomalies distort any effort to normalize or compare speeding violations among carriers that operate in different areas. Consider Figure APP-3 below, which shows that Indiana – accounting for about 3% of commercial vehicle miles each year – writes up 10% of all reported commercial vehicle moving violations nationwide.⁵ Neighboring state Michigan accounts for slightly more than 5% of the moving violations but less than 2% of the miles. Among the top 10 states in moving violations, five – Indiana, Michigan, Illinois, Pennsylvania, and Ohio – are in the Great Lakes region. Carriers that operate in western states inevitably have better Unsafe Driving scores than carriers that operate in the Midwest.

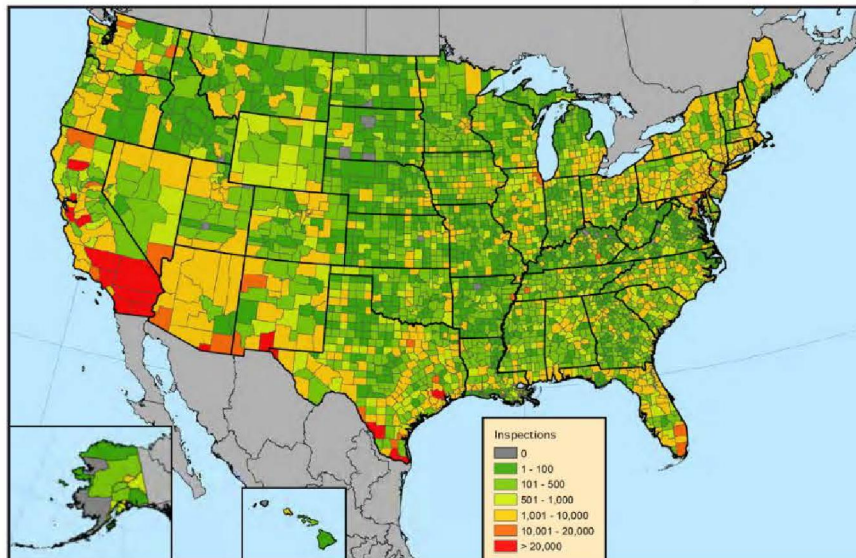
Disparate enforcement also is evidenced by differences in the number of inspections. Together, Texas and California represent more than 40% of

**FIGURE APP-3
MOVING VIOLATIONS BY STATE, 2016**



Source: MCMIS data via Analysis & Information Online (<http://ai.fmcsa.dot.gov>)

**FIGURE APP-4
ROADSIDE INSPECTIONS BY COUNTY, 2016**



Source: 2017 Pocket Guide to Large Truck and Bus Statistics, FMCSA

inspections conducted by state personnel, excluding federal inspections at the border. While those two states are by far the nation's largest in terms of commercial vehicle miles traveled, their share of inspections far exceeds their share of vehicle miles, which combined is about 20%.

While it is true that the high level of freight activity in these two states naturally calls for more inspections than in, say, the Plains or Mountain West, SMS methodology does not consider regional differences. For example, in 2016, Maryland ranked fifth in the number of state inspections at 3.28% of the total, but only 30th in the number of commercial vehicle miles traveled. New Mexico is seventh in inspections but only 19th in the number of commercial vehicle miles. On the other hand, Ohio ranks fourth in commercial vehicle miles but only 13th in inspections. And Louisiana is 13th in commercial vehicle miles but 27th in inspections.

The NAS report suggests that an IRT-based model *could* help adjust for enforcement disparities. Maybe a model *could* be created to simulate a more even distribution of enforcement activities, but the result would be just that: a model. The potentially devastating impact on carriers of relative metrics – especially if made public – is too great to be based on complex calculated projections rather than actual on-road results. Once again, the NAS Report effectively shrugs off an existential threat to small carriers who find themselves in the wrong place at the wrong time – especially when crash causation and the law of small numbers are factored in.

Peer Group Creep

Commenters have long pointed out the distortions of SMS metrics that can result from carriers' shifts among safety event groups, especially as small carriers with volatile metrics ease into a slightly larger peer group. We are heartened, therefore, by the NAS report's recognition of this phenomenon and even somewhat encouraged by FMCSA's initial response on the topic. See 82 Fed. Reg. at 40831.

However, Commenters contend that peer group creep is a bigger problem than FMCSA concedes. We believe FMCSA's suggestion "that the methodology should be revised so that a safety event that is not a violation or a crash is not the sole reason for an increased measure or percentile" is too narrow. Even if an inspection that includes a violation kicks a carrier into a more stringent safety event group, that carrier could instantly appear significantly less safe than is justified by a single violation.

Profiling

As Commenters have shown in past proceedings, anomalous reporting results from the assignment of inspection values to carriers; the availability of weigh station bypass systems like PrePass; and a failure to report clean inspections uniformly throughout all states.

As members of the MCRR Coalition noted in response to FMCSA's SFD Proposal, the Agency's use of inspection profiling and the Inspection Selection System ("ISS") program are inherently biased against small carriers. An unwarranted "negative feedback loop" is created when the system relies primarily on past inspections to target current inspections. Inspection profiling undoubtedly explains why small carriers receive far more scrutiny than their larger counterparts. Power units operated by motor carriers with 1 to 4 trucks are inspected nearly three times as often as those operated by carriers with 1,000 or more trucks.⁶

On this point, Commenters take issue with the statement of Joseph DeLorenzo, director of the FMCSA Office of Enforcement and Compliance, at the September 8 public meeting in this docket regarding clean inspections. While DeLorenzo's comment that 40% of reported inspections do not involve a violation is factually correct, it is misleading because once again there is a wide disparity among states. California, which reports more inspections than any other state, had a clean inspection rate in 2016 of 56.2%, behind only Mississippi, Montana, West Virginia, and Alaska. On the other hand,

Texas, which reports the second-largest number of inspections, had a clean inspection rate near the bottom at 26.1%. Ten states had clean inspection rates below 25%.

Moreover, the above figures are based on situations when an inspection is actually reported. Another major concern is situations when inspectors choose not to report inspections at all because no violation was unearthed in a walk-around. Analyzing this problem obviously is thorny because it involves quantifying the extent of non-existent data. However, there is data beyond extensive anecdotal reports of missing clean inspections. For example, in a survey conducted in 2016 by *Overdrive* and research firm TransAdvise, 48% of carriers reported that clean inspections are not consistently recorded in their experience.⁷

Enforcement Biases

Analysts and regulators tend to ignore the fact that the data feeding their models and databases originate with state agencies and individual inspectors. Commenters have already referred to this phenomenon in the discussion of inconsistent enforcement. For example, Midwestern states such as Indiana and Michigan have focused much of their enforcement efforts in the Unsafe Driving BASIC, while Texas and California have placed relatively more emphasis on the Vehicle Maintenance and Driver Fitness BASICs. Once again, the NAS Report (at p. 51) seems to shrug off state-by-state enforcement differences as being “not something that FMCSA can unilaterally change.”

Another bias lies in the types of violations that inspectors report within individual BASICs. It is much easier to catch a driver on a reporting oversight than it is to painstakingly compare supporting documents to log grids in order to prove a false log. And it is easier to cite a vehicle for an inoperative lamp than it is to crawl under the chassis to inspect brakes caked with dirt and grease.

The effectiveness of the two most important BASICs in terms of carriers covered – Vehicle

Maintenance and HOS Compliance – is undermined by a dominance of minor violations. For example, about half of the HOS Compliance violations are form and manner infractions. The Vehicle Maintenance BASIC is heavily skewed toward violations, such as inoperative marker lights, that standing alone are insufficient to signify that equipment is unfit to operate. Also, profiling of units for vehicle maintenance inspections is particularly high and prejudicial to intermodal carriers, to owner-operators that operate older equipment, and to oilfield carriers that frequently operate off-road.

If the proposed IRT model does not completely resolve the state-by-state inspection and violation distribution discrepancies, or if individual states are not forced into uniformity in inspection and data-collection methods, the same systemic flaws will continue to plague the new model. But even if those systemic flaws somehow could be resolved, no statistical model can veto or repeal the law of small numbers. The NAS Report essentially advocates an enormous investment of time and money to create a highly opaque set of algorithms that – because of these systemic flaws – at best would be only marginally more effective than SMS.

(Footnotes)

¹ Members of this coalition have explored SMS flaws exhaustively in multiple proceedings, most recently in the docket concerning the now-withdrawn SFD Proposal. See

<https://www.regulations.gov/document?D=FMCSA-2015-0001-0184>

. See also

<https://www.regulations.gov/document?D=FMCSA-2012-0074-0070>

² Although percentiles and alerts currently are withheld for property carriers, FMCSA now publishes absolute measures on these carriers, which are not subject to any data sufficiency thresholds. These measures are subject to misinterpretation and are potentially even more damaging than the relative metrics published previously.

³ For example, see

The Relative Contribution of Truck Drivers and Passenger Car Drivers to Two-Vehicle, Truck-Car Traffic Crashes

, D.F. Blower, Publication No. UMTRI-98-25, UMTRI, 1998.

⁴ For example, see the Large Truck and Bus Crash Facts 2015 at

<https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/safety/data-and-statistics/Large-Truck-and-Bus-Crash-Facts-2015.pdf>, p. 77.

⁵ A substantial number of moving violations likely go unreported to FMCSA's Motor Carrier Management Information System because of a change in SAFETEA-LU that allowed states to receive grant funds for issuing moving violation citations on motor carriers without reporting an associated inspection. Many consider this to be the principal reason for the huge drop in traffic enforcement inspections since the mid-2000s.

⁶ See the Vise affidavit in the Coalition comments on the SFD Proposal:

<https://www.regulations.gov/document?D=FMCSA-2015-0001-0184>

⁷ See id.

Guidelines for Journal of Transportation Management Submission/Publication

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$$y = a + 1x + 2x + 3x + ax$$

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Book:

Coyle, John J., Bardi, Edward J., and Novack, Robert A. (2004), *Transportation*, 6th ed., Cincinnati, OH: South-Western College Publishing.

Website:

Wilson, J. W. (2003), "Adapting to the Threat of Global Terrorism: Reinventing Your Supply Chain," [On-line]. Available: <http://georgiasouthern.edu/coba/centers/lit/threat.doc>. Created: 11/01/02, Accessed: 11/12/03.

MANUSCRIPT SAMPLE**A FRAMEWORK FOR EVALUATING SUPPLY CHAIN PERFORMANCE**

Terrance L. Pohlen, University of North Texas

ABSTRACT

Managers require measures spanning multiple enterprises to increase supply chain competitiveness and to increase the value delivered to the end-customer. Despite the need for supply chain metrics, there is little evidence that any firms are successfully measuring and evaluating inter-firm performance. Existing measures continue to capture intrafirm performance and focus on traditional measures. The lack of a framework to simultaneously measure and translate inter-firm performance into value creation has largely contributed to this situation. This article presents a framework that overcomes these shortcomings by measuring performance across multiple firms and translating supply chain performance into shareholder value.

INTRODUCTION

The ability to measure supply chain performance remains an elusive goal for managers in most companies. Few have implemented supply chain management or have visibility of performance across multiple companies (Supply Chain Solutions, 1998; Keeler et al., 1999; Simatupang and Sridharan, 2002). Supply chain management itself lacks a widely accepted definition (Akkermans, 1999), and many managers substitute the term for logistics or supplier management (Lambert and Pohlen, 2001). As a result, performance measurement tends to be functionally or internally focused and does not capture supply chain performance (Gilmour, 1999; *Supply Chain Management*, 2001). At best, existing measures only capture how immediate upstream suppliers and downstream customers drive performance within a single firm.

Table 1 about here

Developing and Costing Performance Measures

ABC is a technique for assigning the direct and indirect resources of a firm to the activities consuming the resources and subsequently tracing the cost of performing these activities to the products, customers, or supply chains consuming the activities (La Londe and Pohlen, 1996). An activity-based approach increases costing accuracy by using multiple drivers to assign costs whereas traditional cost accounting frequently relies on a very limited number of allocation bases.

$$y = a^2 - 2ax + x^2$$

REFERENCES

Manrodt, Karl (2003), "Drivers of Logistics Excellence: Implications for Carriers," In I. W. Wilson (Ed.), *Logistics and Transportation Yearbook 2003* (pp. 126-154) Englewood Cliffs, NJ: Prentice-Hall, Inc.

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