2. Fernandes, D.W., Moori, R.G. and Filho, V.A.V. (2018). "Logistic service quality as a mediator between logistics capabilities and customer satisfaction." Revista de Gestão, Vol. 25 No. 4, pp. 358-372.
3. Mayr, K., Heininger, R., Teller, C. and Stary, C. (2025). "Beware of the customer: Managing customer deviance in last mile logistics." International Journal of Production Economics, p. 109796.
4. Hazen, B. and Ellinger, A. (2019). Logistics Customer Service Revisited. Emerald Publishing Limited.

SAFETY ISSUES IN LOGISTICS: PROTECTING PEOPLE, ASSETS, AND THE SUPPLY CHAIN

D. Sindeev, student,

T. Gerasymchuk, Ph.D, Associate professor,

Kharkiv National Automobile and Highway University

Logistics is the engine of global commerce, but it is also an industry defined by inherent risk. From the warehouse floor to the open highway, safety issues are not merely operational concerns—they are ethical imperatives and financial liabilities. According to the International Labour Organization, the transport and logistics sector consistently ranks among the most hazardous industries worldwide, with warehousing alone accounting for a significant portion of occupational fatalities and injuries.

A single safety failure—a forklift collision, an unsecured load, a fatigued driver—can cascade into lost lives, shattered reputations, regulatory fines, and disrupted supply chains. In an era of faster delivery promises and denser automation, safety must transition from a compliance checkbox to a strategic priority. This article examines the most critical safety issues in logistics and outlines how leading organizations are building cultures of safety that protect both their people and their bottom line.

The Human Cost of Unsafe Logistics Before discussing processes and technology, the human dimension must be centered. Logistics workers face a disproportionate risk of injury compared to other industries. According to the U.S. Bureau of Labor Statistics, the transportation and warehousing sector recorded a fatal injury rate of 14.5 per 100,000 full-time workers in 2022, one of the highest of any industry group (Bureau of Labor Statistics, 2023). Non-fatal injuries, from

musculoskeletal disorders caused by repetitive lifting to crush injuries from falling inventory, affect tens of thousands more workers each year.

Behind every statistic is a person—a picker with chronic back pain, a driver who never made it home, a family forever altered. The ethical case for safety is self-evident, but the business case is equally compelling. The National Safety Council estimates that the total cost of workplace injuries in the United States, including lost productivity and medical expenses, exceeds $167 billion annually (National Safety Council, 2023). For logistics companies operating on thin margins, safety is not a cost center; it is a loss prevention strategy.

Key Safety Issues in Warehousing

Forklift and Pedestrian Interactions Forklifts are the workhorses of the warehouse but also one of its greatest dangers. Forklift accidents cause approximately 85 fatal injuries and 34,900 serious injuries per year in the United States alone (Occupational Safety and Health Administration, 2023). The root cause is often not mechanical failure but human factors: inadequate operator training, excessive speed, obstructed visibility, and pedestrian proximity.

Mitigation strategies include implementing mandatory telemetry systems that enforce speed limits and zones of exclusion, physical barriers that separate forklift traffic from pedestrian walkways, and wearable technology such as proximity sensors that alert operators and pedestrians when they breach safe distances. Research on industrial safety confirms that engineering controls that remove the hazard entirely are far more effective than administrative controls that rely on worker vigilance (Heinrich's Safety Pyramid and subsequent validations emphasize the primacy of hazard elimination).

Manual Handling and Ergonomic Injuries Repetitive lifting, bending, and reaching may not make headlines like a forklift fatality, but they represent the vast majority of logistics injuries. Lower back disorders, carpal tunnel syndrome, and rotator cuff injuries lead to chronic pain, long-term disability, and employee turnover. In an industry already struggling with labor shortages, losing trained workers to preventable ergonomic injuries is a strategic failure.

Leading firms are investing in exoskeleton suits for heavy lifting, adjustable workstations, and automated guided vehicles (AGVs) that handle the most physically demanding movements. A study in the International Journal of Industrial Ergonomics (Kong et al., 2018) demonstrated that passive exoskeletons can reduce lower back muscle activity by up to 40%, significantly lowering the risk of musculoskeletal disorders.

Fire and Hazardous Material Storage Warehouses containing flammable materials, lithium-ion batteries, or chemical products face acute fire risks. The growth of e-commerce has introduced new challenges: denser racking configurations that accelerate fire spread, and a higher volume of batteries in consumer electronics returns. Hazardous materials must be stored in designated zones with proper ventilation, spill containment, and fire suppression systems specifically rated for the materials present. Employee training on Safety Data Sheets (SDS) and emergency evacuation procedures is not optional—it is a legal requirement under OSHA's Hazard Communication Standard.

Road Safety and Transportation Risks

Driver Fatigue and Hours-of-Service Compliance Commercial vehicle crashes caused more than 5,000 fatalities in 2022 (Federal Motor Carrier Safety Administration, 2023). Driver fatigue is a leading contributor, with studies showing that driving after being awake for 18 hours produces impairment equivalent to a blood alcohol concentration of 0.05% (Williamson and Feyer, 2000).

Electronic Logging Devices (ELDs) have made hours-of-service compliance more transparent, but pressure from shippers demanding tight delivery windows can push drivers to the edge of legal limits. Safety-conscious logistics providers must build schedules that account for real-world conditions—traffic, weather, and the driver's circadian rhythms—rather than assuming mathematically perfect transit times.

Distracted and Impaired Driving In-cab technology, including routing apps, communication tablets, and even personal smartphones, creates a constant risk of distracted driving. Fleets are increasingly deploying inward-facing cameras with artificial intelligence that can detect fatigue indicators (e.g., head nodding, yawning)

and distraction events (e.g., handheld phone use), triggering real-time alerts to both the driver and fleet managers.

Cargo Securement and Loading An improperly secured load is a missile in waiting. The Federal Motor Carrier Safety Administration's cargo securement rules mandate that loads be immobilized to withstand forces in all directions, yet failures persist—often because warehouse teams rush to close trailers and drivers do not conduct proper inspections. Responsibility is shared: the warehouse must load correctly, and the driver must verify and document the securement before departure.

The Technology-Safety Intersection Technology is transforming logistics safety from reactive to proactive. Collision avoidance systems, telematics data analytics, and AI-powered risk prediction models allow firms to identify at-risk behaviors before they result in incidents. However, technology also introduces new risks. The rise of autonomous mobile robots (AMRs) in warehouses requires new safety protocols for human-robot interaction. Cybersecurity vulnerabilities can compromise safety systems. Firms must ensure that safety technology is not just deployed but thoughtfully integrated with training and human oversight.

Building a Culture of Safety Policies and equipment are necessary but insufficient without a genuine safety culture. This means leadership that visibly prioritizes safety over productivity when the two conflict, frontline workers empowered to halt unsafe operations without retaliation, and a learning-oriented response to near-misses rather than a blame-oriented one. Research by Zohar (2010) on safety climate demonstrates that when employees perceive management as genuinely committed to safety, incident rates decline significantly.

Near-miss reporting is a cornerstone of this culture. For every major injury, there are often dozens of minor incidents and hundreds of near-misses. A logistics operation that only reacts to serious injuries is like a driver who only looks in the rearview mirror. Proactive organizations encourage reporting of every close call, analyze the root causes, and implement corrective actions that prevent the next incident from ever occurring.

Conclusion: Safety as Competitive Advantage Safety in logistics is not a constraint on productivity—it is its foundation. A safe operation attracts and retains

talent in a tight labor market, lowers insurance premiums, avoids regulatory penalties, and earns the trust of shippers who want their goods to arrive without incident. In a hyper-competitive industry where margins are razor-thin, the inability to run a safe operation is a hidden tax that erodes profitability. Conversely, a demonstrably superior safety record is a differentiator that wins contracts and strengthens brand reputation. The supply chains that will lead the future are those that put safety first—not because they are required to, but because they understand it is the smartest business decision they can make.

References

1. Bureau of Labor Statistics. (2023). National Census of Fatal Occupational Injuries in 2022. U.S. Department of Labor.
2. Federal Motor Carrier Safety Administration. (2023). Large Truck and Bus Crash Facts 2022. U.S. Department of Transportation.
3. Kong, Y.K., et al. (2018). "Evaluation of the effects of passive back-support exoskeletons on trunk muscle activity." International Journal of Industrial Ergonomics, 68, pp. 33-42.
4. National Safety Council. (2023). Work Injury Costs. Available at: www.nsc.org/work-safety.
5. Occupational Safety and Health Administration. (2023). Powered Industrial Trucks (Forklift) Safety. U.S. Department of Labor.
6. Williamson, A. and Feyer, A.M. (2000). "Moderate sleep deprivation produces impairments in cognitive and motor performance equivalent to legally prescribed levels of alcohol intoxication." Occupational and Environmental Medicine, 57(10), pp. 649-655.
7. Zohar, D. (2010). "Thirty years of safety climate research: Reflections and future directions." Accident Analysis & Prevention, 42(5), pp. 1517-1522.

INVENTORY COSTS: THE HIDDEN PRICE OF STOCK

Ye. Malii, student,

Voronova Ye.M, Associate professor,

Kharkiv National Automobile and Highway University

Inventory is often described as the lifeblood of a business—ensuring product availability, buffering against uncertainty, and enabling customer satisfaction. Yet inventory carries a silent, corrosive price that many organizations fail to measure accurately. While the purchase cost of goods is visible on every invoice, the true cost of holding stock extends far deeper, eroding profitability in ways that do not appear on