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## **THE FUTURE OF GROUND TRANSPORTATION: A STUDENT'S PERSPECTIVE**

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*By a Logistics and Supply Chain Management Student* When I tell people I'm studying logistics and transportation, they often picture trucks rumbling down highways, diesel fumes, and endless traffic jams. It's an image from the past, not the future I see. As a student about to enter this industry, I don't see a slow-moving, dirty sector. I see a revolution—one powered by artificial intelligence, clean energy, and entirely new ways of thinking about how people and goods move. The future of ground transportation isn't just about getting from A to B faster; it's about redefining what mobility means for our society, our economy, and our planet. I want to explore that future as I prepare to help build it.

*The Forces Reshaping the Road* My textbooks tell me that ground transportation accounts for roughly 6% of global CO2 emissions, with heavy trucks being a major culprit (International Energy Agency, 2023). That's a staggering number, and it's one of the reasons I feel a mix of excitement and responsibility. The generation before me built a system that moved the world, but also warmed it. My generation's task is to

decarbonize that system while making it smarter and more equitable. I'm not just learning to manage fleets; I'm learning to transform them.

What strikes me most is the convergence of three powerful trends: electrification, automation, and digitalization. Each alone would be significant, but together they promise to reshape ground transportation more profoundly than anything since the invention of the internal combustion engine. And unlike past revolutions that took decades, this one is happening at a pace that feels almost dizzying.

*Electrification: More Than Just Cars* The most visible symbol of the future is the electric vehicle. I see them every day on campus—sleek, silent, and increasingly common. But the future of ground transportation goes far beyond passenger cars. I recently attended a guest lecture by a fleet manager who described how his company is transitioning its entire delivery van fleet to electric. The total cost of ownership, he said, is already lower than diesel for urban routes, once you factor in fuel and maintenance savings (International Council on Clean Transportation, 2022). It surprised me to learn that the biggest barrier isn't technology or even vehicle cost—it's the charging infrastructure, or rather the lack of it.

As a student, I find myself thinking about the energy grid. If millions of trucks and vans go electric, where will the power come from? My professors stress that a green transportation system needs a green grid, or we're just shifting emissions from tailpipes to power plants. The interdisciplinarity of this challenge excites me: I may need to understand not just logistics but energy systems, urban planning, and even behavioral economics to be effective in this field. The student in me also worries about range anxiety, especially for long-haul trucking. I've read about battery-swapping stations and megawatt charging systems being piloted in Europe and China (International Transport Forum, 2023). It's the kind of innovation that makes me think I'm entering the workforce at exactly the right time.

*Automation: The Truck That Drives Itself* Autonomous vehicles get the most hype, and it's easy to see why. The idea of a truck driving itself across the country captures the imagination. But the more I study, the more I realize that full autonomy is still years away for complex, mixed-traffic environments. What's happening now is

more subtle and, I think, more practical. Advanced driver-assistance systems—automatic braking, lane-keeping, platooning—are already improving safety and fuel efficiency. I’ve read that truck platooning, where vehicles communicate to drive closely together, can cut fuel use by up to 10% for the trailing truck (Tsugawa, Jeschke and Shladover, 2016). That’s not sci-fi; it’s happening in real-world trials.

From a student’s perspective, automation raises tough questions. The truck driver is one of the most common jobs in many countries, and my classmates and I often debate what will happen to those workers. I don’t believe the narrative that drivers will simply disappear overnight. Instead, I foresee a shift: drivers becoming in-cab logistics managers, monitoring systems, handling exceptions, and taking over only when the autonomous system encounters a situation it can’t handle. That means the skills I’m learning—supply chain visibility, exception management, data analytics—might become relevant even for frontline operators. It also means that education and retraining will be critical, and I hope the industry invests in people as much as it invests in sensors and algorithms.

*The Digital Mesh: Visibility, AI, and the End of Empty Miles* The part of ground transportation that truly fascinates me is the digital layer. When I interned at a third-party logistics provider last summer, I saw firsthand how fragmented the system still is. Trucks drive empty for miles because shippers and carriers can’t match loads efficiently. One study estimates that empty miles account for up to 20% of all truck kilometers in the European Union (European Environment Agency, 2022). That’s wasted fuel, wasted time, and unnecessary emissions.

Digital freight platforms are starting to solve this. They work like ride-sharing apps for cargo, connecting shippers with carriers in real time. But the real leap will come when artificial intelligence can predict demand, dynamically price capacity, and optimize routes not just for a single truck but for an entire network. I’ve been learning about machine learning algorithms that can forecast shipment volumes and suggest repositioning of assets before a problem arises (McKinnon et al., 2015). This is the kind of technology that makes me want to dive deep into data science, even though I’m more of a logistics generalist.

Blockchain is another buzzword, and I was skeptical at first. But the idea of a shared, immutable record of custody and condition, accessible to every party in the supply chain, could reduce disputes and fraud. I wrote a paper on this and found that companies like Maersk and IBM were experimenting with blockchain for supply chain documentation (Kshetri, 2018). It's early days, but the potential for trust and transparency is enormous. As a future professional, I want to work on making these digital tools practical, not just theoretical.

*Urban Logistics: The Last Mile and the Final Frontier* The most exciting—and frustrating—part of ground transportation is the last mile. In cities, congestion is choking productivity and air quality. E-commerce has exploded, and the expectation of same-day delivery is now standard. I've seen delivery vans double-parked on my street, blocking traffic while the driver runs a package to a doorstep. It's inefficient, and it's not sustainable.

The solutions I'm learning about feel like they're straight out of a smart-city blueprint. Micro-fulfillment centers inside urban areas shorten the distance to the customer. Cargo bikes and electric scooters are handling deliveries in places where vans can't easily go. Lockers and pickup points consolidate deliveries and eliminate failed attempts. In a course project, I modeled the impact of switching just 10% of van deliveries to cargo bikes in a medium-sized city; the emissions savings were impressive, but the cost per parcel was still higher. The economic equation isn't yet fully there, but I believe it will be as battery technology improves and cities introduce low-emission zones.

Then there are delivery robots and drones. I watched a video of a small, cooler-sized robot trundling along a sidewalk, delivering groceries. It seemed both futuristic and slightly comical. But the technology is maturing quickly. Regulations, public acceptance, and sidewalk infrastructure are the real barriers. I'm optimistic that my generation, which grew up with technology, will be more comfortable with autonomous delivery devices—but only if they're safe and don't endanger pedestrians.

*The Human Element: A Student's Reflection* I sometimes worry that in all this talk of technology, we'll forget the human beings who make ground transportation

work. The drivers, dispatchers, warehouse workers, and mechanics are the backbone of the industry. As I prepare to enter this workforce, I wonder how I can contribute to a transition that is fair and inclusive. Automation might displace some jobs, but it will also create new ones—fleet analysts, robotics technicians, sustainability coordinators. My education is giving me a foundation in the technical and strategic aspects, but I want to also carry forward a sense of responsibility for the social dimension.

I recently interviewed a veteran truck driver for a class assignment. He told me about the camaraderie of the road, the independence, and the pride he takes in delivering essential goods. He also admitted he's worried about his son following in his footsteps. That conversation stays with me. The future of ground transportation must be one where technology enhances human dignity, not diminishes it. That means designing systems that support workers, not just replace them. It means training programs that prepare people for new roles. And it means listening to the people who have been doing this work for decades.

*The Road Ahead* As a student, I stand at the edge of this transformation. I feel privileged to be studying at a time when the fundamentals of ground transportation are being rewritten. The choices made in the next decade—by governments investing in infrastructure, companies adopting new technologies, and young professionals like me entering the field—will shape mobility for the rest of the century.

I don't have all the answers. I'm still learning how to balance idealistic visions with operational realities. But I know that the future I want to help build is one where ground transportation is clean, safe, efficient, and accessible. Where trucks hum quietly through neighborhoods instead of roaring. Where goods move without waste. Where drivers are respected and empowered by technology, not marginalized by it. And where the systems we design serve communities rather than the other way around.

In my capstone project this semester, I'm modeling a regional delivery network that integrates electric trucks, cargo bikes, and a digital platform to minimize emissions and cost. It's a small academic exercise, but it feels like a microcosm of the real challenge. The numbers sometimes don't add up. The constraints are real. But the possibilities are exhilarating. That's why I'm optimistic. Because the future of ground

transportation isn't just about machines; it's about the people who will imagine, design, and manage them—and I plan to be one of them.

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## THE WHEELS OF A NATION: A HISTORY OF LAND TRANSPORT IN UKRAINE AND KHARKIV

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For millennia, the lands of modern-day Ukraine have served as a vast crossroads where empires, trade routes, and cultures intersect. The history of land transport here is a story of constant adaptation—from the earliest tracks carved by Bronze Age traders to the railway networks that stitched together vast imperial territories, and on to the modern highways and metro systems that define independent Ukraine. This journey is mirrored in the fate of Kharkiv, a city that rose from a frontier military outpost in the 17th century to become Ukraine's second-largest metropolis, its explosive growth fueled by successive transportation revolutions. This article traces that shared journey: the evolving arteries of movement that shaped a nation and the city that became one of its most vital transport hubs.

*Ancient Routes and Medieval Highways* The story of land transport in the region begins not with roads as we know them, but with a network of primitive trade routes