ST.GALLEN SYMPOSIUM

Global Essay Competition 2025

Title: Pedal Power: Redefining Mobility for a Multipolar World

Essay:

For decades, road transportation has been synonymous with economic progress, facilitating the movement of people, goods, and services. Yet, the hidden costs - crippling congestion, escalating pollution, unsustainable infrastructure spending, and dependence on volatile energy markets - have turned this model into a ticking time bomb, especially for emerging economies in Asia, Africa, and Latin America. As these nations rise as new global power centers, they face a defining moment: will they inherit the West's flawed, car-dependent legacy, or will they forge a bold new path toward smarter, more resilient mobility?

A car-centric economy is unsustainable. It depletes financial resources, worsens social inequalities, and locks nations into fossil fuel dependence, undermining economic and geopolitical stability. Yet, an alternative exists - one that is cheaper, cleaner, and vastly more efficient. The bike-first economy isn't a step backward; it's a leap forward, offering emerging markets a faster route to economic growth, energy independence, and environmental leadership.

By embracing cycling and e-bikes as the backbone of personal mobility, these nations can bypass the failures of the past and build cities designed for the future. This essay challenges the outdated paradigm of car dependency and presents a visionary framework for why a bike-first economy is not just viable, but essential, for the next wave of global powers in the 21st century.

The Pitfalls of Car Dependency

The widespread adoption of a car-centric development model in emerging economies presents a fundamental challenge to long-term economic growth, sustainability, and social equity. While automobile ownership and expanded road networks have long been symbols of modernization [1], the inefficiencies of such a system create compounding economic, environmental, and public health burdens.

One of the first and most visible consequences is urban congestion [2]. As more people own cars, traffic bottlenecks worsen, slowing supply chains and decreasing productivity. Congestion produced an economic loss of nearly $87 billion in the U.S. in 2018 [3]. Car dependency

increases financial burdens, disproportionately impacting lower-income populations [4]. Meanwhile, governments in car-dependent countries divert substantial resources to constructing and maintaining road infrastructure, with U.S. state and local governments spending $206 billion on highways in 2021 [5] - often at the expense of essential services like education and healthcare. Studies suggest that beyond a certain point, excessive urbanization built around car dependency diminishes economic returns, leading to stagnation rather than progress [6].

Beyond financial strain, car dependency accelerates environmental degradation [2]. The transportation sector remains one of the largest contributors to greenhouse gas emissions [7], exacerbating climate change and public health risks. Air pollution from internal combustion engines, particularly diesel particulate matter (DPM), is linked to respiratory diseases, inflammation, and lung damage [8]. Emerging economies, which are often more vulnerable to climate shocks [9], bear a disproportionate burden from this car-dependent infrastructure.

Perhaps most critically, car dependency ties national economies to fossil fuel markets [2], making them susceptible to price fluctuations and geopolitical instability. Many emerging economies remain net importers of petroleum, creating trade imbalances and economic volatility. This dependency is further reinforced by a complex web of economic and political mechanisms, including state subsidies for road expansion, lobbying efforts from automotive and oil industries, and structural incentives that favor car ownership over public transit alternatives [1]. By embedding private vehicle ownership into their infrastructure planning, these nations risk long-term financial instability, as energy market disruptions directly affect transportation systems and economic mobility.

Persisting with car dependency will deepen these vulnerabilities, but emerging economies can still redefine their mobility strategies. By abandoning car dependency in favor of sustainable urban planning, nations can build a cost-effective, efficient, and resilient transport system.

Rethinking Mobility in an Emerging Multipolar World

As global power shifts, emerging economies have a unique opportunity to redefine urban mobility and gain a strategic advantage over industrialized nations burdened by inefficient infrastructure. A modern, non-car-dependent model can unlock economic growth, enhance resilience, and position nations as global leaders in sustainable development.

By investing in high-density, multimodal transport systems, emerging economies can reduce congestion, lower infrastructure costs, and increase productivity. Compact, well-connected cities foster stronger business ecosystems, attract global investment, and create more accessible job markets. Smart urban planning can optimize land use, freeing up space for commercial growth, green areas, and housing solutions.

Energy independence is another key advantage. Shifting away from car-centric models reduces reliance on volatile fossil fuel markets, enhancing national stability and freeing up resources for domestic energy innovation. Additionally, better air quality and improved public health lower healthcare burdens and increase workforce efficiency, contributing to long-term economic sustainability.

The nations that embrace efficient, people-centered mobility will enhance global competitiveness, reduce vulnerabilities, and drive urban innovation. Instead of replicating outdated models, they can lead the next phase of economic and infrastructural evolution, ensuring a future-proof foundation for growth in a multipolar world.

A Bike-First Economy as a Sustainable Alternative

To break free from car dependency, emerging economies must redesign urban transport around cycling, e-bikes, and multimodal mobility. Unlike cars, which require costly infrastructure and fuel, bicycles are affordable [10–12], scalable, and immediately deployable, unlocking economic productivity, cleaner air, and energy resilience while fostering inclusive mobility.

While public transit and electric vehicles (EVs) are often seen as sustainable solutions, they have significant limitations. Public transit demands large-scale investments and lacks flexibility in rapidly growing cities, while EVs still contribute to congestion and energy dependence. In many countries, motorcycles are currently the main mode of transport due to their affordability [13], but economic growth may lead to a shift toward car ownership [14]. In contrast, bicycles require no fuel, take up less space [10, 11, 15, 16], and can be rapidly integrated into urban planning at minimal cost.

Bicycles also reduce congestion and improve health [11, 12, 17–19], easing pressure on healthcare systems. However, many cities prioritize motorized transport, leaving cycling infrastructure underdeveloped and unsafe. To make bikes a mainstream solution, governments must invest in protected bike lanes [20], cycling-friendly urban planning, and policy incentives, transforming mobility into a cost-effective, efficient, and sustainable system.

Strategic Pillars of Implementation

Infrastructure Investment and Urban Planning

A bike-first economy demands a shift in urban planning, prioritizing cycling as a core mode of transport rather than an afterthought. Instead of investing in car-centric expansion, governments must focus on protected bike lanes, high-capacity cycling corridors, and multimodal transport hubs to ease congestion, improve accessibility, and lower infrastructure costs [10, 15]. Yet, infrastructure decisions have long been influenced by automobile, oil, and construction industry lobbying, sustaining car dependency despite its inefficiencies [1].

Cities like Copenhagen, Amsterdam, and Bogotá demonstrate the economic, environmental, and social benefits of prioritizing cycling [12]. Investments in protected bike lanes and cycling bridges can make cycling the most efficient and preferred mode of transport, enhancing both public health [18] and economic productivity [19]. Similarly, Amsterdam's commitment to cycling has resulted in safer streets, reduced emissions, and higher urban mobility efficiency. Bogotá's extensive cycling network and Ciclovía program, which opens city streets to cyclists on Sundays, showcases how even rapidly urbanizing cities can successfully promote cycling as a mainstream mode of transport, being cost benefitial for the city [21].

To make cycling a practical and mainstream option, cities must integrate it into broader urban development. This includes expanding bike parking, supporting shared micro-mobility services, and fostering compact, mixed-use developments that naturally reduce reliance on cars. Well-designed, such as proposed super-cycle highways [12], encourage active transport and enhance overall mobility. Well-designed cycling infrastructure also prevents accidents, which are still a main issue, even in cyclist-centric cities [18]. Separated bike facilites can substantially reduce accident numbers [20].

Cycling should also be part of a larger, multimodal network rather than a standalone solution. Bike-sharing at transit hubs improves connectivity and public transport integration. This holistic mobility strategy makes cities more resilient, efficient, and adaptable, laying the foundation for a sustainable and productive urban future.

Financial and Policy Incentives

Governments must introduce targeted policies that make bicycles and e-bikes more accessible while discouraging car dependency. Financial incentives and regulatory support can accelerate mass adoption [22, 23].

To accelerate the transition to a bike-first economy, governments must implement a combination of financial incentives and regulatory measures that make cycling a more attractive and accessible option. Direct subsidies and tax rebates can lower the cost of e-bikes, particularly for lower-income populations, ensuring that sustainable mobility is not limited to wealthier demographics [23]. Beyond individual consumers, businesses should also be encouraged to integrate e-bikes into their corporate mobility plans through targeted financial incentives.

At the same time, policymakers must address the entrenched dominance of automobiles by introducing car disincentives that shift urban behavior. Strategies such as congestion pricing, increased parking fees, and vehicle taxation can help curb unnecessary car use, making cycling a more practical and cost-effective alternative. However, financial incentives alone are insufficient - long-term behavioral and cultural shifts are also essential in normalizing cycling as an everyday mode of transport.

Public awareness campaigns, workplace mobility programs, and early exposure through education can reinforce the transition. Likewise, integrating cycling education into school curricula and community programs can help instill lifelong habits that make biking a natural, socially accepted alternative to cars.

By combining smart financial policies with behavioral incentives, governments and businesses can create an environment where cycling is not just an option but a preferred and convenient mode of transportation. This shift requires not only infrastructure and policy support but also a transformation in societal attitudes, ensuring that cycling becomes embedded in everyday life.

Technology and Innovation

To fully evolve the potential of a bike-first transportation policy, emerging economies must invest in cycling-related technology, ensuring that bicycles and e-bikes integrate seamlessly into urban mobility ecosystems. While cities like Copenhagen and Amsterdam are global cycling leaders, they have yet to fully integrate cycling into smart urban planning [24], often prioritizing high-tech mobility solutions over cycling-first urban innovation. This oversight highlights a critical lesson: smart technology should enhance cycling infrastructure, not just sideline it.

Technology and innovation play a crucial role in making bikes the main mode of private transportation not only feasible but also highly efficient. One key aspect is the development of smart infrastructure, where cities implement data-driven traffic management systems that prioritize cycling corridors and enhance road safety. Unlike Copenhagen and Amsterdam, emerging economies have the opportunity to build smart cycling systems from the ground up, using technology to optimize traffic flow, reduce congestion, and create safer cycling environments.

At the same time, battery and e-mobility development must be a national priority. Supporting domestic production of e-bike batteries and charging infrastructure can lower costs, foster energy independence, and reduce reliance on imports. Prices of batteries are expected to lower in the future as well [25]. This development strengthens mobility resilience while ensuring that e-bikes remain an affordable and scalable alternative to cars and motorcycles.

Moreover, shared and on-demand mobility services can bridge gaps in urban transport networks. Expanding bike-sharing programs through public-private partnerships and integrating them with app-based transport services will ensure widespread accessibility also for those, who cannot afford buying a bike in the first place. Unlike Copenhagen and Amsterdam, where

smart city initiatives often overlook cycling's full potential [24], emerging economies can take the lead by making bicycles as convenient as ride-hailing services, encouraging mass adoption and transforming urban mobility into a seamless, sustainable experience.

The Broader Impact of a Bike-First Economy

A bike-first transport system is not just a sustainability initiative - it is a radical economic strategy that redefines modern development and challenges outdated Western models. Emerging economies have a historic opportunity to reject the car-dependent trap that drains resources, deepens inequalities, and ties nations to volatile energy markets. Instead, they can leapfrog into a future of economic resilience, energy sovereignty, and urban efficiency.

Beyond mobility, a bike-first economy unlocks economic growth, geopolitical leverage, and social equity. Reduced fossil fuel dependence strengthens financial stability and negotiating power on the global stage. Cleaner cities improve public health, reduce congestion, and attract investment, positioning leaders in this shift as pioneers of modern urban innovation. Nations that prioritize efficient, sustainable transport will gain competitive advantages in trade, climate leadership, and technological progress.

This transition is not merely urban but a strategic move toward independence from fossil-fuel inefficiencies. The nations that act decisively will not just adapt to global power shifts but lead them, setting new standards for economic success, environmental leadership, and urban competitiveness. The question is no longer whether the world will move beyond car dependency, but which nations will embrace pedal power to shape the future, and which will be left behind.

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Auxiliary aids:

Aid	Usage	Affected parts
ChatGPT	(Re-)Formulation of sentence fragments	Various parts
ChatGPT	Spell and grammatics checker	Entire paper
Private spell-checking	Removing spelling errors	Entire paper

TABLE 1: Auxiliary Aids Directory