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BEYOND THE STEERING WHEEL: WILL AI AND AUTONOMOUS VEHICLES DISRUPT THE E-HAILING GIG ECONOMY?

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Abstract: **Artificial intelligence (AI) and autonomous vehicle (AV) technologies are beginning to reshape the economics and organisation of passenger mobility. Their potential impact on the e-hailing gig economy is especially significant because digital ride-hailing platforms have created employment and income opportunities for millions of drivers while reorganising urban transport around algorithmic matching, dynamic pricing and platform-mediated work. This conceptual review examines whether the arrival of autonomous vehicles will displace human e-hailing drivers, transform platform business models or produce a hybrid mobility system in which human and autonomous fleets coexist. Drawing on recent developments in Singapore, Malaysia and international robotaxi markets, the paper argues that disruption is likely to be gradual, geographically uneven and shaped by regulation, infrastructure, consumer acceptance, vehicle economics and the operational limits of autonomous systems. It distinguishes AI-enabled tools used in conventional ride-hailing from higher levels of vehicle automation, and analyses five pathways of change: labour substitution, platform restructuring, capital concentration, new forms of work and regulatory transition. The paper also considers the distributional consequences for drivers, including income insecurity, sunk vehicle costs, algorithmic management and unequal access to reskilling. It proposes a just-transition framework based on early consultation, portable social protection, transparent platform governance, targeted skills development and phased AV deployment.**

The central conclusion is that autonomous mobility may not eliminate e-hailing platforms; rather, it could shift the platform's core productive asset from a dispersed community of driver-partners to fleets of capital-intensive vehicles.

Whether this transition improves mobility without deepening inequality will depend on the institutions governing it.

Keywords: **artificial intelligence; autonomous vehicles; robotaxis; e-hailing; gig economy; platform work; labour displacement; Southeast Asia; Malaysia; just transition.**

I. INTRODUCTION

Digital ride-hailing has transformed urban passenger transport over the past decade. Platforms such as Grab, Uber and regional competitors connect passengers with drivers through smartphone applications, matching demand and supply in real time. This model has provided flexible earning opportunities, reduced some barriers to entering the transport market and expanded mobility options. At the same time, it has generated debates about income volatility, platform commissions, algorithmic management, social protection, employment classification and the transfer of vehicle operating costs to individual drivers.

A new technological transition is now emerging. Advances in artificial intelligence, sensing, mapping, computing and vehicle control have enabled autonomous vehicles to move from laboratory demonstrations towards limited commercial

passenger services. Robotaxis and autonomous shuttles are no longer purely speculative. In Singapore, Grab and WeRide have expanded autonomous shuttle operations in Punggol and announced an on-demand autonomous vehicle pilot, while Grab has described a hybrid mobility strategy in which autonomous vehicles complement its driver community (Grab, 2026a). In September 2026, Grab announced plans to increase its Singapore AV fleet from 10 to 50 vehicles over six months, subject to regulatory approvals (Grab, 2026b).

These developments raise a question with direct implications for the future of work: will the e-hailing driver become redundant as vehicles become capable of transporting passengers without a human operator? The answer is not straightforward. Technological capability does not automatically translate into widespread deployment. Autonomous systems must operate safely in complex traffic, meet legal requirements, achieve acceptable utilisation, secure insurance, and deliver a cost advantage over human-driven vehicles. In Southeast Asia, mixed traffic, motorcycles, unpredictable road behaviour, weather, road quality and uneven digital infrastructure add further complexity.

The question is therefore not simply whether AI can drive a car. It is whether autonomous mobility can become commercially, socially and institutionally viable at sufficient scale to change the structure of platform work. This paper examines that question through a conceptual review focused on Southeast Asia, with particular attention to Malaysia and Singapore. It argues that disruption is plausible but will be uneven, and that public policy should prepare for transition before large-scale displacement occurs.

II. CONCEPTUAL CLARIFICATION: AI, AUTOMATION AND AUTONOMOUS MOBILITY

AI is a broad family of computational methods used to recognise patterns, make predictions, optimise decisions and support automated tasks. E-hailing platforms already use AI in driver-passenger matching, route recommendation, estimated arrival times, fraud detection, customer support, demand forecasting, dynamic pricing and driver performance systems. These applications can intensify algorithmic management without removing the human driver. In this sense, the gig economy is already an AI-mediated labour market.

Autonomous driving is a more specific application. It combines perception systems, sensors, maps, prediction, planning and vehicle-control technologies to perform some or all of the dynamic driving task. The Society of Automotive Engineers (SAE) automation levels distinguish driver assistance from conditional, high and full driving automation. A vehicle with advanced driver-assistance features is not equivalent to a driverless robotaxi. At lower automation levels, a human remains responsible for supervision and fallback. At higher levels, the system performs the driving task within a defined operational design domain.

This distinction matters for employment analysis. Driver-assistance systems may change the skills and safety requirements of professional drivers, but they do not necessarily eliminate the occupation. Fully driverless services, by contrast, can remove the human driver from the vehicle during qualifying trips. Even then, human labour may remain necessary for remote assistance, cleaning, charging, maintenance, fleet repositioning, passenger support, incident response and operations management.

The likely trajectory is therefore not a simple transition from human driving to machine driving. It is a reorganisation of tasks and value capture across the mobility system. The driver's role may change, the platform may become a fleet orchestrator, and new forms of technical and operational work may emerge.

III. THE E-HAILING GIG ECONOMY: VALUE CREATION AND VULNERABILITY

The e-hailing model is built on a platform that coordinates passengers, drivers, payments, location data and service quality. Drivers typically supply or finance the vehicle and bear many operating costs, including fuel or electricity, maintenance, insurance, cleaning, depreciation and financing. The platform supplies the digital marketplace, brand, payment infrastructure, matching system and access to demand. This arrangement allows platforms to scale without owning every vehicle, while drivers retain responsibility for a substantial share of capital and operating risk.

Flexibility is a central attraction of gig work, but it can coexist with income uncertainty. Earnings may fluctuate with demand, location, incentives, platform commissions, fuel prices, competition and the time spent waiting between trips. Algorithmic systems influence which jobs drivers receive, how fares are calculated and how performance is evaluated. Drivers may have limited ability to understand or challenge these decisions.

Malaysia provides an important case study. An ISEAS–Yusof Ishak Institute analysis in 2026 describes the growth of platform-based transport and delivery work since 2012 and notes the difficulty of establishing precise counts of active workers. It also discusses the regulatory evolution of e-hailing, including operator licensing, driver licensing, vehicle requirements and social protection issues (Lee, 2026). The APAD knowledge base sets out requirements for Malaysian e-hailing drivers, including registration with a licensed operator, a valid Public Service Vehicle vocational licence and an active e-hailing vehicle permit (APAD, 2026).

The policy environment is also changing. Malaysia's Gig Workers Act and associated policy discussions indicate growing recognition that platform workers require clearer rights and protections. ISEAS notes that debates have included minimum income arrangements, social protection and the practical costs of compliance (Lee, 2026). In Budget 2027, the Malaysian government announced a RM160 million co-funded package with Grab intended to improve net income and welfare for e-hailing and p-hailing workers, including vehicle maintenance, insurance and SOCSO support (Bernama, 2026). These initiatives address current vulnerabilities, but the arrival of AV fleets introduces a further question: how will protections apply when the platform's service is increasingly supplied by machines rather than individual drivers?

IV. HOW AUTONOMOUS VEHICLES COULD DISRUPT E-HAILING

A. Direct substitution of driving labour

The most visible pathway is the substitution of human drivers on routes and in operating zones where autonomous services are legally authorised and technically reliable. If a platform or fleet operator can provide a passenger trip without paying a driver per journey, it may eventually reduce the cost of supplying rides. The economic incentive is strongest in dense urban areas with predictable routes, high passenger demand, favourable weather and infrastructure that supports mapping, connectivity, charging and fleet management.

However, the cost comparison is more complex than removing a driver's fare share. An autonomous fleet requires expensive vehicles and sensor systems, software development, remote operations, maintenance, cleaning, charging, insurance, regulatory compliance and depreciation. Vehicles may need to be specially designed or retrofitted. Their utilisation must be high enough to recover capital costs, while downtime, empty repositioning trips and low-demand periods can weaken profitability. Human-driven vehicles may remain more economical in dispersed areas, complex environments or markets where labour costs are relatively low.

B. Platform restructuring and fleet ownership

A second pathway concerns the platform's business model. Traditional e-hailing platforms generally coordinate a distributed network of independent or self-employed drivers. Autonomous mobility may encourage platforms to partner with vehicle manufacturers, AV developers, fleet owners, leasing companies and charging providers. The platform could become a marketplace for both human-driven and autonomous rides, allocating trips according to price, availability, service level and operational constraints.

Grab's stated hybrid mobility strategy illustrates this possible direction. Its Singapore AV pilots are being developed with technology partners and local regulators, while the company has also described pathways for interested driver-partners to transition into AV-related roles (Grab, 2026a). This model suggests that platforms may seek to manage the transition rather than simply abandon their driver networks. Yet the distribution of benefits will depend on who owns the vehicles, who controls the data and software, and who captures the savings created by automation.

C. Capital concentration and barriers to entry

The gig economy's low-asset platform model could give way to a more capital-intensive mobility system. Autonomous fleets require large investments in vehicles, compute systems, mapping, depots, charging, maintenance and safety assurance. This may favour large platforms, automakers, technology companies and institutional investors. Smaller local operators may find it difficult to compete unless they can access shared fleets, public infrastructure or cooperative ownership models.

Capital concentration can alter competition. If a small number of firms control the AV fleet, operating system, passenger interface and trip data, they may gain substantial bargaining power. Competition policy will need to consider not only passenger fares but also access to platforms, data portability, interoperability and the ability of independent fleet operators to participate.

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D. New occupations and task transformation

Automation may eliminate some driving tasks while creating demand for other work. Potential roles include fleet supervisors, remote assistance operators, vehicle cleaners, charging and maintenance technicians, safety auditors, mapping specialists, cybersecurity staff, customer-support personnel and incident investigators. Existing drivers may be able to transition into some of these roles, but not automatically. The required skills, working conditions, pay levels and number of positions may differ substantially from current driving work.

A critical risk is that the number of new jobs may be smaller than the number of driving jobs displaced, and that the new roles may require technical qualifications or be concentrated in major cities. Training alone cannot guarantee a comparable livelihood if the labour market does not generate sufficient vacancies. Transition planning must therefore include income protection and pathways to adjacent occupations, not only short courses.

E. Algorithmic management may intensify

AI can affect drivers even before full autonomy becomes widespread. More sophisticated demand prediction, fare optimisation, driver scoring, automated customer service and dispatch systems may improve operational efficiency while increasing the asymmetry of information between platforms and workers. If autonomous vehicles are introduced into the same dispatch ecosystem, human drivers may compete with fleets whose availability and operating costs are managed centrally. Without transparent rules, platforms could allocate trips in ways that gradually reduce the utilisation and earnings of human drivers.

V. SOUTHEAST ASIA: A UNEVEN PATH TO AUTONOMOUS MOBILITY

Southeast Asia is not a single AV market. Singapore offers a comparatively compact urban environment, strong digital infrastructure, extensive regulatory capacity and active public-sector involvement in mobility trials. Its Punggol programme demonstrates how AV services can be introduced within defined areas, routes and operating conditions before expansion. Singapore's Ministry of Transport has stated that current deployments are governed through a regulatory sandbox and that a more comprehensive legislative framework for AV ride-hailing is being developed, with legislation expected to be tabled in the second half of 2027 (MOT Singapore, 2026).

Grab's 2026 announcements indicate that Singapore is becoming a regional testbed for hybrid ride-hailing. Its July announcement described an on-demand AV pilot, while the September announcement set out plans to expand the fleet fivefold and potentially extend coverage beyond Punggol, subject to approvals (Grab, 2026a; Grab, 2026b). These are important developments, but they should not be interpreted as proof that driverless services are already commercially viable across the region.

Malaysia has a different starting point. The Ministry of Transport defines e-hailing as an application-based intermediation service for booking public transport, while APAD regulates relevant operators and vehicle permits. In 2026, Malaysia's public consultation on the development of an Autonomous Vehicle Roadmap sought views on legal and governance requirements, infrastructure and technology readiness, safety, public acceptance, social implications and economic opportunities (MOT Malaysia/MIROS, 2026). This consultation is significant because it recognises that AV policy must address social and institutional readiness as well as engineering.

Malaysia's road environment includes dense urban corridors, motorcycles, mixed road users, variable infrastructure quality, heavy rainfall and different traffic conditions across states and regions. These factors may make deployment more complex than in carefully bounded pilot zones. They do not make autonomy impossible, but they suggest that operational design domains will need to be carefully defined and independently assessed. The country may initially see AVs in controlled industrial parks, campuses, airports, logistics hubs or limited urban corridors before broad deployment in general traffic.

Other Southeast Asian countries will follow different paths depending on public transport systems, vehicle markets, urban form, regulation, road infrastructure and investment. Some may adopt autonomous shuttles in planned districts or tourist areas; others may prioritise advanced driver assistance, fleet logistics or public transport automation. The result is likely to be a patchwork of deployment rather than a region-wide transition at the same time.

VI. THE SOCIAL AND ECONOMIC CONSEQUENCES FOR DRIVERS

The potential impact on drivers extends beyond the loss of a job title. Many drivers have invested in vehicles, taken loans or leases, and organised household finances around expected platform earnings. If demand for human-driven rides falls in particular locations, drivers may face reduced trip volumes while continuing to service vehicle debt, insurance and maintenance costs. The timing of displacement may be especially difficult because the transition could be gradual: earnings may decline before a clear alternative occupation becomes available.

The burden is unlikely to be evenly distributed. Drivers who depend on e-hailing as their primary income may face greater exposure than occasional or supplementary drivers. Older workers, workers with limited formal education and those with fewer digital or technical skills may find it harder to move into new roles. Women and workers with caregiving responsibilities may face additional barriers to training that requires fixed schedules or travel. These are policy risks that require empirical study rather than assumptions about every driver's circumstances.

There is also a question of procedural fairness. Drivers should not learn about major changes only after platforms have altered dispatch algorithms or reduced incentives. They need timely information about pilot locations, expected fleet expansion, the likely effect on trip allocation and the availability of transition support. Worker consultation can improve policy design and help identify operational problems that technology developers may overlook.

At the same time, AV deployment could bring public benefits if it improves road safety, access for people unable to drive, service availability during off-peak hours and transport connectivity in underserved areas. Those benefits should be assessed through independent evidence. Claims about safety or cost reductions should not rely solely on company promotional statements. Public authorities should require transparent reporting of crashes, disengagements, service interruptions, accessibility performance and the circumstances in which remote or human intervention is needed.

VII. REGULATION, LIABILITY AND PUBLIC TRUST

Autonomous passenger services raise regulatory questions that extend beyond vehicle approval. Authorities must determine who is responsible when a collision occurs, how insurance should operate, what safety evidence is required before commercial deployment, how cybersecurity incidents are handled, and how passenger data are collected and used. A licensing framework must also address fleet operators, software providers, vehicle manufacturers and platforms where responsibilities are shared.

Malaysia's AV Roadmap consultation provides an opportunity to develop a framework that includes road safety, infrastructure, technology, social impact and economic opportunity (MOT Malaysia/MIROS, 2026). A safety-first approach should define operational design domains, independent testing, incident reporting, post-crash investigation, cybersecurity standards and clear liability arrangements. Mixed traffic and vulnerable road users, including motorcyclists, cyclists and pedestrians, must be central to assessment.

Public trust is equally important. Passengers may worry about safety, privacy, accessibility and the ability to obtain help during an emergency. Drivers may worry about livelihood displacement and unequal treatment. Communities may be concerned about congestion caused by empty repositioning vehicles or the use of public road space by private fleets. Transparent consultation and open performance data can help build legitimacy.

Labour regulation must also adapt. If platforms operate autonomous fleets alongside human drivers, rules should prevent discriminatory dispatch practices and clarify how trip allocation, pricing and performance data are governed. Existing worker protections should not disappear merely because a platform's business model changes. New technical workers also require clear employment standards and occupational safety protections.

VIII. A JUST-TRANSITION FRAMEWORK FOR THE E-HAILING SECTOR

This paper proposes a six-pillar framework to manage the transition from human-driven to increasingly autonomous ride-hailing:

1. Advance notice and worker consultation. Require platforms and AV operators to disclose material deployment plans, pilot geographies and expected changes to human-driver demand, and establish structured consultation with driver associations and worker representatives.

2. Portable social protection. Strengthen access to injury protection, health coverage, retirement savings and income support that can follow workers across platforms and occupations. Contributions should reflect the responsibilities and economic capacity of platforms, fleet owners and workers.

3. Skills and occupational pathways. Develop practical training for fleet operations, EV maintenance, charging, customer support, safety monitoring, mapping and digital services. Training should be linked to recognised credentials and real vacancies rather than offered as a substitute for income protection.

4. Fair platform governance. Require meaningful explanations for automated decisions affecting driver access, trip allocation, incentives and account suspension. Establish accessible appeal mechanisms and independent audits for material algorithmic systems.

5. Inclusive AV deployment. Use phased pilots with clear public-interest objectives, publish safety and service performance data, and assess effects on congestion, accessibility, public transport and employment before geographic expansion.

6. Competition and shared value. Promote interoperability, fair access to mobility data, transparent procurement and opportunities for local firms and worker-owned cooperatives to participate in fleet services. Ensure that productivity gains are not captured exclusively by a small number of capital owners.

The framework recognises that transition policy must begin before large-scale job displacement. Governments should establish baseline data on the number and profile of active e-hailing drivers, income distribution, vehicle financing exposure, working hours and geographic concentration. Without reliable baseline information, it will be difficult to estimate the scale of risk or target support.

Public support for AV companies should also be conditional. Where governments provide land, infrastructure, tax incentives, procurement contracts or regulatory privileges, agreements should include public reporting, safety obligations, local capability development and credible workforce-transition measures. The public should receive measurable benefits in return for public resources.

IX. DISCUSSION: DISRUPTION, COMPLEMENTARITY OR COEXISTENCE?

Three broad futures are possible. In a substitution scenario, autonomous fleets become sufficiently reliable and cost-effective in dense urban areas to replace a significant share of human-driven trips. Platforms and fleet owners capture much of the productivity gain, while drivers face declining demand. This scenario is more plausible in controlled operating zones and high-utilisation corridors than across all road environments at once.

In a complementarity scenario, AVs serve particular routes, times or passenger segments while human drivers continue to operate in complex, dispersed or specialised settings. Human drivers may provide assistance for passengers with special needs, operate in areas outside the AV service domain or handle trips where human judgement remains valuable. Platforms may allocate work across both categories.

In a hybrid transition scenario, which appears consistent with current platform strategies, human and autonomous vehicles coexist under one mobility interface. This may reduce the risk of abrupt service disruption, but it does not guarantee fair outcomes for workers. If the platform gives autonomous fleets priority because of lower marginal operating costs, human drivers may experience gradual erosion of trip opportunities even while remaining formally eligible to use the app.

The most important uncertainty is the pace at which the total cost of autonomous service falls relative to human-driven service. That comparison depends on vehicle purchase and financing costs, fleet utilisation, maintenance, insurance, remote assistance, energy prices, software licensing, regulatory compliance and the cost of human labour. It also depends on consumer acceptance and the reliability of service in local traffic conditions. These variables differ across countries and cities, making universal predictions unreliable.

Accordingly, claims that e-hailing drivers will disappear within a fixed number of years should be treated cautiously. The direction of technological change is clear, but the timing and scale of labour displacement remain contingent. Policymakers should prepare for credible scenarios without presenting speculative timelines as established facts.

X. CONCLUSION

AI and autonomous vehicles have the potential to disrupt the e-hailing gig economy, but the transition is likely to be gradual, uneven and institutionally mediated. AI already shapes ride-hailing through matching, pricing and algorithmic management. Higher levels of vehicle automation introduce a more fundamental possibility: the removal of the human driver from some passenger journeys. This may transform the platform from a coordinator of individual driver-partners into an orchestrator of human and autonomous fleets.

The consequences will depend on who owns the vehicles, who controls the technology and data, how savings are distributed, and whether workers have meaningful opportunities to transition. Singapore's AV pilots demonstrate that commercial and public-sector experimentation is advancing in Southeast Asia. Malaysia's AV Roadmap consultation and evolving gig-worker policy provide an opportunity to prepare before large-scale deployment. Neither market, however, should assume that pilot success automatically translates into safe, affordable and equitable mass adoption.

The future of e-hailing should not be framed as a contest between human drivers and machines. It is a governance challenge involving productivity, mobility, safety, competition and decent work. Autonomous technology may improve transport services, but technological progress alone does not guarantee social progress. A just transition requires early worker consultation, portable social protection, transparent algorithms, credible retraining pathways, independent safety oversight and competition rules that prevent excessive concentration. The steering wheel may become automated, but responsibility for the future of mobility must remain human.

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