

The Future of E-Hailing and Food Delivery: Will AI and Robots Kill the Food Delivery Gig Economy?

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Abstract: Artificial intelligence (AI) and autonomous delivery technologies are reshaping how e-hailing and food delivery platforms operate. Algorithms already match orders, allocate couriers, predict arrival times, adjust incentives and evaluate performance, and autonomous delivery robots are being tested for parts of the last mile. This paper asks whether these developments will eliminate the food delivery gig economy or reorganise the work that people perform within it. It is a qualitative narrative review of research and institutional publications from 2020 to 2026 covering algorithmic management, platform work in Asia and the Pacific, and autonomous delivery robotics. The review finds that automation can absorb some routine coordination and short, predictable deliveries, but wider adoption is held back by infrastructure, weather, traffic, regulation, food handling, security, public acceptance and the complexity of door-to-door handover. In the near term, AI is more likely to manage and intensify human work than to replace the delivery workforce. Three pathways are identified: augmentation, selective substitution and localised labour displacement. The central policy challenge is therefore not to halt innovation but to share its gains fairly through worker consultation, transparent algorithms, portable social protection and reskilling. The paper concludes that delivery work will change substantially, yet a fully workerless system is unlikely to become the norm in Southeast Asia by 2030.

Keywords: Artificial intelligence; autonomous delivery robots; food delivery; e-hailing; gig economy; algorithmic management; Southeast Asia; platform work.

I. INTRODUCTION

Ordering a meal through an app has become routine in Southeast Asian cities. Customers browse menus, pay and follow the courier on a map, while the platform coordinates restaurants, riders and payments in the background. E-hailing services run on much the same digital infrastructure to match passengers with drivers. Both models combine software, physical mobility and a flexible workforce. As AI, predictive analytics and autonomous robots mature, a pressing question follows: will these technologies remove the people who carry the food, or will they change how those people are managed and deployed?

The question matters because platform work offers income to large numbers of people while raising persistent concerns about security, earnings and protection. The International Labour Organization (ILO, 2021) finds that digital labour platforms have widened access to work but have also brought income volatility, algorithmic control and gaps in social protection. In Southeast Asia, app-based transport and delivery are dominated by a few large platforms whose algorithms govern matching, pricing, incentives and worker evaluation (Tan & Gong, 2024). Wider labour-market evidence adds a note of caution. Industrial robots have reduced employment and wages in exposed local labour markets in the United States (Acemoglu & Restrepo, 2020), and in five Southeast Asian economies robot adoption created jobs for skilled formal workers while displacing many low-skilled workers between 2018 and 2022 (World Bank, 2025).

This paper examines the relationship between AI, delivery robots and the food delivery gig economy through three questions: (1) which delivery tasks are most exposed to automation; (2) which technical and social constraints limit full substitution; and (3) how can platforms, governments and workers prepare for change? The study does not forecast exact

job losses or report fieldwork. Its central argument is that automation is more likely to transform and selectively replace tasks than to remove human delivery work altogether in the near term.

II. REVIEW APPROACH AND CONCEPTUAL FRAMEWORK

A. Review Method

The review draws on peer-reviewed studies and institutional reports published between 2020 and 2026 on digital labour platforms, algorithmic management in food delivery, Southeast Asian platform work and autonomous delivery robots. Sources were identified through bibliographic databases and the publication pages of international organisations, then synthesised around four themes: task automation, operational constraints, consequences for workers and governance. The approach is narrative rather than systematic. It offers an interpretive assessment of the evidence and does not calculate a pooled estimate of employment effects.

B. Guiding Concepts

Three concepts frame the analysis. The first is the difference between automating a task and replacing an occupation. A robot may carry an order from a restaurant to a building entrance without taking over food preparation, order checking, building access or the final handover. The second is algorithmic management, the use of software to coordinate, monitor and evaluate work. Rani and Furrer (2021) show how platform design features and algorithmic management assign, monitor and evaluate work in developing countries, with consequences for access to tasks, pay and working time. Kellogg et al. (2020) describe the same logic as a new “contested terrain” in which algorithms restrict, recommend, record, rate, replace and reward workers. The third concept is a just transition, which asks whether workers share in productivity gains and receive meaningful protection when technology alters the demand for their labour.

It is equally important to separate AI software from physical robotics. Software can optimise routes, forecast demand, detect fraud, estimate preparation times and allocate orders without moving a single meal. Autonomous delivery robots add sensors, navigation, obstacle avoidance and physical movement. Srinivas et al. (2022) review recent work on robot-driven delivery and identify both efficiency gains and unresolved operational problems. The two technology groups may complement each other, but their effects on employment are not the same.

III. HOW AI IS ALREADY CHANGING PLATFORM DELIVERY

A. Automated Matching and Dispatch

Platforms rely on algorithms to link orders with restaurants and couriers, estimate demand and calculate expected arrival times. Tan and Gong (2024) describe how Southeast Asian platforms use these systems to match supply and demand, set dynamic prices and incentives and monitor performance. Coordination of this kind works at a scale no human dispatcher could manage, but it also sets the practical conditions under which couriers receive and complete jobs. An ethnographic study of leading Chinese food delivery platforms found that riders are organised as an outsourced, app-based workforce and steered through techniques such as smart machinery control, information monopoly and “carrots and sticks” (Huang, 2023).

B. Route Optimisation, Space and Demand Prediction

AI-supported routing can cut unnecessary travel and allow couriers to complete more drops in a shift, while demand forecasting can guide where couriers wait and when incentives are offered. These tools improve the use of resources. They can also raise work intensity if targets ignore traffic, weather, restaurant delays or road safety. Heiland (2021) shows that platforms use geolocation and geofencing to define the spatial corridors in which couriers operate, which makes space itself an instrument of labour control. Survey evidence from China links algorithmic management to risk-taking behaviour among food delivery riders through perceived algorithmic control and emotional rumination (Liu et al., 2025).

C. Ratings, Incentives and Algorithmic Control

Automated performance systems draw on acceptance rates, cancellations, customer ratings and delivery times to decide who gets work and on what terms. Tan and Gong (2024) note that opaque decision-making leaves Southeast Asian platform workers unsure how incentives, penalties and job allocation actually operate, and the ILO (2021) reports limited worker autonomy and weak access to remedies. Workers do respond. Wu et al. (2023) examine the coping behaviour of riders on a Chinese food delivery platform, and Huang (2026) documents everyday tactics through which migrant couriers dodge, leverage or subvert the algorithm, prompting platforms to retune their systems. In the near term, then, AI is more likely to extend managerial control over how, when and at what price couriers work than to replace them.

D. Customer Service and Platform Operations

AI chat systems can answer routine questions, provide order updates and resolve simple complaints, which may reduce some administrative roles. Complex cases involving missing items, food safety, refunds or road accidents still require judgement and accountability. Platforms should not treat automated support as a substitute for timely review by a human decision-maker.

IV. AUTONOMOUS DELIVERY ROBOTS: PROMISE AND LIMITATIONS

A. Potential Benefits

Autonomous delivery robots are best suited to short, predictable routes on university campuses, business parks, pedestrianised districts and planned residential estates. Reviews identify potential gains in cost, delivery time and emissions (Srinivas et al., 2022). Alverhed et al. (2024) organise the literature around four themes, namely operations, infrastructure, regulation and acceptance, and conclude that robots can lower costs, use time more efficiently and reduce externalities when these foundations are in place. Engesser et al. (2023) add that electrified autonomous solutions could operate around the clock and ease driver shortages. In practice, robots are most likely to work alongside human couriers, for example on a fixed link between a cluster of restaurants and a nearby collection point.

B. The Last-Mile Problem

Food delivery is not simply movement from one point to another. A courier may need to climb stairs, use lifts, pass security at a gated condominium, cross busy roads, ride through heavy rain and find a unit in a building with no standard layout. A robot may reach the lobby yet still need a person to verify the recipient and hand over the meal. In dense Southeast Asian cities, mixed traffic, uneven or obstructed pavements, tropical downpours and irregular building access all complicate autonomous operation. These are implementation constraints specific to context; they do not prove that robots cannot work in the region.

C. Safety, Security, Acceptance and Regulation

Autonomous devices must avoid pedestrians, children, pets and vehicles, and they must protect food from tampering, heat, rain and delay. Theft, vandalism, connectivity failures and battery limits all add to operating costs. Public acceptance is a further condition. Studies have examined how the COVID-19 pandemic shaped acceptance of delivery robots (Pani et al., 2020) and how consumers in urban settings evaluate them (Yuen et al., 2022). A survey of 1,344 e-commerce customers in Europe, Asia and the United States found that people already familiar with the technology were more willing to use it (Montero-Vega et al., 2025). Regulators, meanwhile, are still deciding how robots may share pavements with pedestrians, and Kovacic et al. (2024) treat sidewalk delivery robots as a disruptive urban technology that municipalities are only beginning to govern. Clear liability rules are needed for cases in which a robot injures someone, damages property or fails to deliver. Performance in a controlled trial should not be confused with reliable operation across a whole city.

D. Economics and Deployment Geography

The business case depends on capital cost, maintenance, utilisation, insurance, charging, remote supervision and the availability of suitable routes. Robots may pay off where many orders follow short, repeatable paths. They are less attractive for dispersed orders, complex addresses or locations where a human courier can combine several tasks in one trip. Deployment is therefore likely to be selective and geographically uneven. Table I summarises how exposed the main delivery tasks are to automation in the near term.

TABLE I: NEAR-TERM EXPOSURE OF FOOD DELIVERY TASKS TO AUTOMATION

Task	Main technology	Near-term exposure	Key constraint
Order matching and dispatch	AI and optimisation algorithms	High (already automated)	Transparency and fairness of allocation
Routing and demand forecasting	Machine learning, geolocation	High (already automated)	Work intensity and road safety
Routine customer support	AI chat systems	Moderate to high	Complex disputes need human review
Short, fixed-route transport	Autonomous delivery robots	Moderate in controlled sites	Infrastructure, cost, acceptance, regulation
Door-to-door handover	Robots with remote supervision	Low	Stairs, lifts, security, recipient verification
Exception handling	Human judgement	Low	Unpredictable addresses, delays and incidents

V. WILL AI AND ROBOTS KILL THE FOOD DELIVERY GIG ECONOMY?

A. Scenario 1: Augmentation of Human Couriers

Under augmentation, AI improves dispatch, routing and demand prediction while people continue to carry out physical delivery and deal with customers. Robots may cover a limited section of a journey, with a courier completing the handover. This pathway preserves most human tasks but changes the skills required, such as working with automated systems and resolving exceptions the software cannot handle.

B. Scenario 2: Selective Substitution

Under selective substitution, autonomous systems take over some short, repetitive deliveries in places with supportive infrastructure. Demand for couriers could fall on those routes or at certain times, while people remain essential for complex, longer or access-restricted deliveries. The scale of substitution will depend on operating costs, regulation, customer acceptance and technical reliability. The robotics literature treats autonomous delivery as a developing option whose barriers in infrastructure, regulation and acceptance remain substantial (Alverhed et al., 2024; Srinivas et al., 2022).

C. Scenario 3: Labour Displacement and Platform Restructuring

A more disruptive pathway would combine autonomous vehicles, automated kitchens, predictive ordering and tightly integrated logistics, reducing some delivery and coordination roles, especially in controlled environments. The burden would not fall evenly. Evidence from regional robot adoption shows that gains tend to accrue to skilled workers while low-skilled workers are pushed into lower-paid and less secure jobs (World Bank, 2025). Workers with few alternatives would face the highest adjustment costs. Dewan and Kashyap (2026) stress that platform governance in Asia and the Pacific must address labour and social protection as business models evolve.

D. Why Complete Replacement Is Unlikely in the Near Term

Full replacement would require reliable performance across diverse roads, buildings, weather and customer situations, together with public acceptance, legal permission and a positive financial return. People provide adaptability when addresses are wrong, restaurants run late, customers cannot be reached or a delivery calls for judgement. These constraints make task-level automation more plausible than the sudden disappearance of the workforce. This is an analytical judgement based on the operational and labour literature reviewed here, not a guaranteed prediction. Table II compares the three scenarios.

TABLE II: COMPARISON OF AUTOMATION SCENARIOS FOR FOOD DELIVERY

Dimension	Augmentation	Selective substitution	Labour displacement
Role of AI	Supports dispatch and routing	Coordinates mixed human–robot fleets	Integrates ordering, kitchens and logistics
Role of robots	Limited, partial journeys	Short fixed routes in suitable sites	Wide use in controlled environments
Effect on couriers	Tasks and skills change	Fewer jobs on specific routes	Significant job losses in some areas
Near-term likelihood	High	Moderate	Low, but locally possible
Main policy need	Algorithmic transparency	Transition support and consultation	Social protection and redeployment

VI. IMPLICATIONS FOR WORKERS, PLATFORMS AND GOVERNMENTS

A. Worker Protection and Algorithmic Transparency

Platforms should explain the main factors behind job allocation, pay calculation, incentives, ratings and account suspension. Workers need a timely appeal process and access to a human decision-maker whenever an automated decision affects their income. Tan and Gong (2024) show that algorithmic management reaches beyond individual transactions, isolating workers and concentrating decision-making power. Transparency should therefore be matched by genuine worker consultation.

B. Portable Social Protection and Fair Classification

Many couriers work across several apps or only part of the year, so social protection must accommodate variable earnings and multiple sources of work. Governments should clarify who is responsible for occupational injury cover, insurance, contributions and dispute resolution. The ILO (2021) highlights the need for regulatory coherence so that innovation does not undermine decent work, and Dewan and Kashyap (2026) call for comprehensive governance and social dialogue across Asia and the Pacific.

C. Reskilling and Transition Support

Training should build capabilities that complement automation: safe use of digital tools, customer communication, basic equipment maintenance, logistics coordination and the handling of delivery exceptions. Reskilling cannot solve displacement by itself if suitable jobs are not available. It should be tied to recognised credentials, employer commitments and routes into other sectors.

D. Responsible Innovation and Worker Participation

Pilot projects should assess effects on pedestrian safety, courier income, service quality and local congestion before any wider rollout. Workers and local communities should have a say in route selection and operating rules, consistent with the emerging municipal governance of sidewalk robots (Kovic et al., 2024). Platforms should publish the objectives of each pilot and set out transition arrangements in advance if human work is reduced.

E. A Human-Centred Automation Framework

A responsible framework has four components: (1) a task-level impact assessment before deployment; (2) transparent algorithmic management with rights of appeal; (3) social protection and transition support for affected workers; and (4) public safety and accountability standards for autonomous devices. Evaluation should measure cost per delivery and also worker net earnings, injury rates, delivery reliability, customer complaints and environmental effects.

VII. DISCUSSION

Asking whether AI will “kill” the gig economy frames automation as a contest between people and machines. The evidence describes a more complicated process. AI already shapes how delivery work is organised, even when a person completes every journey. Robots may take over selected physical tasks, but the last mile is full of unpredictable social and physical interactions that resist standardisation. The likely near-term outcome is a combination of human labour, algorithmic coordination and limited robotic deployment.

This does not mean workers are safe from harm. Platforms can raise efficiency while shifting operational risk onto couriers through variable pay, unpaid waiting time and performance pressure (Huang, 2023; Rani & Furrer, 2021). If robots arrive without consultation, couriers may see fewer orders or fiercer competition for the jobs that remain. The policy question is therefore not only whether technology can replace a task, but who captures the productivity gains and who carries the cost of the transition.

The review has limitations. Robotics studies tend to evaluate technical performance and logistics efficiency rather than long-term employment effects in Southeast Asian cities, and much of the empirical work on algorithmic control comes from China and Europe. Institutional studies of platform work document labour conditions but do not quantify future displacement by robots. Future research should compare controlled robot trials with conventional courier operations and track total costs, service reliability, worker income and employment over time.

VIII. CONCLUSION

AI and autonomous robots will change e-hailing and food delivery, but current evidence does not support the claim that they will eliminate the food delivery gig economy. AI is already central to matching, routing, pricing, incentives and performance monitoring. These applications improve coordination while increasing the power platforms hold over workers. Robots may reduce the need for couriers on selected short and predictable routes, yet complex buildings, weather, traffic, safety, security, public acceptance and the final handover remain significant constraints.

The most plausible near-term future is a mixed system in which software coordinates orders, robots perform selected tasks and people handle the flexible, uncertain and customer-facing work. That transition can still bring displacement and income insecurity, particularly if platforms deploy technology without consulting workers or providing adequate protection. Governments should strengthen algorithmic transparency, accessible appeals, occupational safety, social protection and accountability for autonomous devices, and platforms should assess task-level employment effects and offer credible transition support. Technology is already transforming delivery work; the open question is whether that transformation will be governed so that its benefits are shared fairly. A human-centred approach offers a sounder basis for sustainable innovation than treating labour as a cost to be engineered away.

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