



Rider safety in quick commerce: Occupational risk, algorithmic pressure, and regulatory implications

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Abstract

Quick commerce is described by ultra-fast delivery times, which range from 10 to 30 minutes. This has significantly changed consumption patterns in urban areas worldwide. Even though the concept has been developed to enhance consumer convenience, there have been significant concerns regarding occupational safety, particularly for delivery riders on two-wheelers in heavy traffic in urban areas. In this paper, we attempt to discuss rider safety, crash risk, algorithmic management, psychosocial stress, and regulatory interventions from an interdisciplinary literature perspective. In this paper, we have attempted to include international empirical research and Indian road crash data, which includes national data as well as the latest government guidelines that reject the 10-minute delivery concept. This paper has identified the structural risk drivers and suggested multi-level interventions through infrastructure, algorithmic change, labor protection, and regulatory enforcement using a systematic literature review approach. From the findings, it is proposed that the safety issues of the riders are systemic in nature and not individual.

Keywords: Quick commerce, rider safety, last-mile delivery, algorithmic management, occupational risk, road accidents

Introduction

The emergence of digital platforms has led to a substantial shift in the retail and logistics industry, which led to the evolution of quick commerce. Q-commerce is a business model that caters to the ultra-fast delivery of products, which is usually done within 10-30 minutes. Technological development of quick-commerce platforms is driven by the growth of such platforms. However, the business model which places a high value on speed, convenience and efficiency to the customer creates a range of issues of the delivery riders working within the q-commerce system.

To ensure punctuality of deliveries, the delivery riders within the q-commerce system are faced with time-sensitive stressors that include traffic jams, unfavorable weather, and long working hours. These forces increase the consequences of road traffic accidents, bodily harm, mental distress, exhaustion and possible long-term health effects. Delivery riders in the q-commerce business sector, unlike the employees in the logistics industry, often work in informal or semi-formal employment relations, thus making it difficult to enjoy the health insurance and social security benefits. Job stress increases performance-based incentives, customer response, and algorithm-based management systems, which might result in risky behaviours during riding like overspeeding and breaking traffic rules. Despite the rapid growth of the quick-commerce industry, it is becoming one of the relatively unexplored in the literature questions.

The studies on the gig economy and platform work have also revealed the issues of job insecurity, unstable earnings and the rights of the workers, but the complex problems of the rider safety, in its physical, psychological, and organisational aspects, have not been fully investigated. This vulnerability is especially evident in the world developing states, where the systems of regulations and

protective measures are poorly organized and developed to protect employees on the work place.

In the proposed study, we would like to discuss the rider safety in the context of the quick-commerce and provide insights into the main risk factors that influence the delivery riders, the impact of platform policies and algorithms, and the effectiveness of the current safety measures. The hope is that this research can add to the knowledge that currently exists on platform work and assist in creating a safer and more sustainable delivery platform.

Objectives of the Study

- Focus on knowing the type of risks the delivery riders experience, particularly in places with heavy traffic such as India where two-wheelers are the major contributors to road deaths. The research places the work of delivery in the broader perspective of road safety to determine whether platform delivery contributes to the existing traffic risks.
- To study the influence of algorithmic systems on the rider behavior. Due to the fact that order assignments, ratings and bonuses are managed by software, it is worthwhile to check whether such systems cause pressure that would prompt riders to ride faster or to behave unsafely.
- To research the economic reality of gig delivery work. The unpredictable income, income based on incentives, and inadequate social security can drive riders towards working longer hours or delivering more that could cause more fatigue and probability of accidents.
- To assess new regulation changes, including the elimination of 10 minutes delivery promises in India. It will determine whether those changes really relieve the pressure or whether larger changes in the system will be required.

- Provide policy implications that attempt to compromise on speed and the safety of riders. The project relying on road safety, labor economics, and platform rules will enable the study to assist in developing a faster and safer version of commerce.

Literature Review

To comprehend the safety of q commerce riders, it is necessary to combine theories from the field of transportation safety, labor sociology, and human machine interaction. The two theoretical perspectives that are most relevant to this analysis are:

Job Demands-Resources (JD R) Model: The JD R model argues that job demands such as workload and time pressure increase stress when job resources such as autonomy and support are inadequate (Bakker & Demerouti, 2017) [1]. The deadlines for delivery and the performance criteria have raised the pressure on Q commerce riders, and this pressure is often coupled with a lack of resources to cope with the stress and risks (Yu, Zhang & Yun, 2024) [25].

Theory of Algorithmic Management: The application of automated systems that can allocate tasks, track performance, and manage workers through data-driven feedback is referred to as algorithmic management (Kellogg, Valentine & Christin, 2020) [6]. Algorithms are applied in delivery apps to regulate earnings, allocate tasks, and ensure speed standards. The potential of these systems is to increase levels of work-related stress and actions that

may endanger the safety of q commerce riders (Salmon *et al.*, 2023) [16].

Occupational Risk and Crash Exposure

International Findings- Based on a systematic review of 38,000 last-mile delivery riders, motorized two-wheelers were the most at-risk group, with involvement in crashes between 14% and 22% (Useche *et al.*, 2025) [23]. Based on a Korean cohort study, delivery motorcycle riders had a 21.3% involvement in crashes (Kim *et al.*, 2025) [7]. Based on a survey study in Malaysia, 14.6% of riders were involved in crashes, with young riders being the most at-risk group (Rahman *et al.*, 2022) [13]. Time pressure is a significant factor associated with risky motorcycle riding practices such as signal violations and speeding (Rush Hours Study, 2026).

India specific Crash Scenario: India offers a dangerous road environment for two-wheeler riders. With over 27,500 two-wheeler deaths, India accounts for a large chunk of road traffic deaths (MoRTH, 2023). Two-wheeler riders comprised the largest proportion of these deaths. Seventy-one percent of motorcycle crash-related deaths involved two-wheeler riders, not pillion riders (AIIMS Trauma Study, 2023). Speeding is responsible for over 70% of road deaths in the country (MoRTH, 2023). Local authorities in Kochi issued notices to quick commerce companies for risky two-wheeler riding practices due to time-bound delivery commitments (Times of India, 2025) [21].

Table 1: Crash Risk Comparison – India and International Studies

| Study | Country | Sample | Crash Rate (%) | Key Risk Factors |
|----------------------------------|--------------|----------|----------------------|---------------------------|
| Useche <i>et al.</i> , 2025 [23] | Multicountry | 38,000+ | 17.8 | Fatigue, speed |
| Kim <i>et al.</i> , 2025 [7] | South Korea | 2,345 | 21.3 | High delivery frequency |
| Rahman <i>et al.</i> , 2022 [13] | Malaysia | 1,200 | 14.6 | Young riders, long hours |
| Rush Hours Study, 2026 | Thailand | 500 | 18.2 | Time pressure |
| MoRTH Report, 2023 | India | National | 27,500 fatalities | Speeding, violations |
| AIIMS Trauma Study, 2023 | India | 3,750 | 71% rider fatalities | Two-wheeler vulnerability |

Compiled by the author using data from Road Accidents in India 2023 (MoRTH, 2023) and international studies cited.

Algorithmic Management and Time Pressure: Algorithmic systems organizing q commerce delivery work affect safety not only through setting up expectations but also through shaping daily behaviors. (Sun *et al.* 2024) show that algorithmic monitoring can worsen stress and risky behaviors when riders are judged on narrowly defined performance criteria such as delivery time and punctuality. In controlled empirical studies, interactional algorithmic monitoring, where algorithms actively encourage performance, strengthened the link between driver stress and risky behaviors (Yu, Zhang & Yun, 2024) [25]. In addition to monitoring, algorithms are also engaged in dynamic job assignment, where they encourage fast acceptance and completion of jobs, which in turn encourages performance pressure. Qualitative studies among riders have shown that such systems are often experienced as opaque and coercive, which in turn reduces riders’ perceptions of autonomy and their safety-oriented behaviors in favor of speed (Suvarnapathaki *et al.*, 2025) [24]. Research on algorithm dynamics also indicates that real-time performance feedback is associated with increased cognitive load and risktaking among delivery workers (Chen *et al.*, 2022).

Psychosocial Stress and Health Outcomes: Occupational stressors in q-commerce go beyond crash risk to encompass mental health issues. Systematic reviews have identified the relationship between poor working conditions, economic insecurity, and algorithmic control and stress, fatigue, and burnout among last mile delivery workers (Useche *et al.*, 2025) [23]. A study in Ho Chi Minh City showed that job and financial-related stress during the COVID-19 pandemic was associated with increased rates of risky behaviors, such as speeding and dangerous crossing, indicating that psychological distress is manifested as physical risk-taking behaviors (Tran *et al.*, 2022) [22]. Moreover, qualitative studies among riders in Australia have emphasized the chronic anxiety of riders about their earnings and acceptance of orders, with some riders indicating that the fear of not being assigned future tasks pushed them to make haste with deliveries at the cost of their own safety (Churchill & Wang, 2024). Studies have also identified long working hours, insufficient rest, and irregular work patterns as factors that contribute to both acute and chronic health problems, such as musculoskeletal stress and sleep problems (Mao *et al.*, 2025) [8].

Regulatory and Policy Reactions: The intersection of academic evidence and social concern has led to regulatory attention. In the early part of 2026 ^[18], the Indian government asked major quick commerce companies to remove the 10-minute delivery option from their marketing and user interfaces, citing rider safety concerns (Reuters, 2026) ^[15]. Since then, companies such as Blinkit, Swiggy, and Zepto have altered their service terms to reflect less extreme delivery times. This move indicates that the government is aware that extreme delivery times can be a rider safety concern. There have also been instances of enforcement, such as traffic police sending show cause

notices to delivery companies for violating road safety rules (Times of India, 2025) ^[21]. However, available evidence indicates that such policy changes at the branding level may not necessarily have an immediate impact on safety. Available news reports suggest that many commuters are still not aware of such policy changes, and the incentive schemes related to speed and earnings continue to affect the impact of such policies (Economic Times, 2026) ^[18]. Researchers have suggested that policymakers need to move beyond the level of adjustments in language to deal with the underlying pressures related to algorithms (Cambridge University, 2025) ^[17].

Table 2: Policy Responses

| Country | Policy | Description |
|--------------|--------------------------|-------------------------------|
| India | Removal of 10-min claims | Reduce extreme speed pressure |
| UK | Algorithm transparency | Improve worker protection |
| South Africa | Labour campaigns | Raise awareness |

Developed by the author based on Kellogg *et al.* (2020) ^[6], Yu *et al.* (2024), and Salmon *et al.* (2023) ^[16].

Worker Perceptions and Informal Risk Management- Delivery riders are often aware of the risks they are taking but are forced to make a trade-off between safety and financial needs. The survey and interview findings indicate that the riders are often willing to take more risks in order to earn more money and meet the acceptance criteria of the platform, as well as maintaining a positive engagement score with the algorithmic system (Economic Times, 2026; Simet, 2025) ^[18, 21]. The findings are consistent with the general literature on precarious work, where workers use informal risk management strategies that are not part of the formal safety system (Rosenblat & Stark, 2016). Examples from South Africa and Europe indicate that the media discourse and stakeholder engagement are increasingly bringing the rider perspective to the forefront, with delivery riders demanding more transparency, equitable task assignment, and better protection (Duri, 2025; The Guardian, 2025) ^[17].

Methodology

Apart from the use of secondary data obtained from credible news outlets and industry publications, we have used a systematic literature review (SLR) approach. This approach ensures that the findings are thorough, verifiable, and peer-reviewed. Literature Search Methodology includes Google Scholar, PubMed, ScienceDirect, Web of Science, and Scopus.

Mitigation Strategies

Various academic and industry circles have identified several mitigation strategies to improve rider safety:

- **Training and Education:** Delivery rider road safety training has been identified as having potential to lower risk of crashes and promote safer riding practices (Training and Development Practices, 2025).
- **Infrastructure Improvements:** Urban design strategies such as designated motorcycle lanes and enhanced road lighting can lower vulnerability to high-risk interactions with other vehicles (Kuwait Study, 2025).
- **Algorithmic Redesign:** Algorithmic design incorporating safety outcomes and integrating speed

goals with rider well-being indicators may lower risk-taking behavior (Salmon *et al.*, 2023) ^[16].

- **Social Protection:** Improving delivery riders’ access to insurance, healthcare, and social security benefits could enhance physical safety and financial protection after a crash (Times of India, 2025) ^[21].

Discussion

Because rider safety in quick commerce is systemically integrated into the occupational risk context, which is affected by a variety of factors, the combination of data from India and other countries reveals that it is more than a behavioral problem. There are four factors that particularly emerge as being closely intertwined: lack of labor rights, economic insecurity, time pressure generated by algorithms, and dangerous traffic environments.

First, dangerous traffic environments suggest a baseline risk of accidents, especially in India. Twowheelers are responsible for a disproportionately large number of road deaths in the country, as traffic accident statistics reveal (MoRTH, 2023). Indian quick commerce delivery riders ride motorcycles and scooters in a high-density, mixed-traffic environment that is susceptible to congestion, a lack of lane discipline, and infrastructural deficiencies, as opposed to the Western model, which is car-based for delivery. Regardless of their personal capabilities, delivery riders are structurally vulnerable to higher levels of risk in this environment. Consequently, quick commerce delivery riders are exposed to some of the most hazardous driving conditions in the world. Second, this vulnerability is compounded by the time constraints imposed by algorithms. Orders, routes, and real-time delivery time tracking are all managed by the management platform (Kellogg *et al.*, 2020; Yu *et al.*, 2024) ^[6]. While businesses may claim that rider safety is their number one concern, algorithmic optimization often prioritizes optimization criteria such as speed, order completion rate, and high acceptance rates (Kellogg *et al.*, 2020; Yu *et al.*, 2024) ^[6]. Even if advertising for “10-minute delivery” is separate from the actual system, current policies may still promote faster drop-offs by rewarding faster delivery, charging more during peak hours, or evaluation systems. This situation may be described as “structural time compression,” where riders feel the pressure of time to

increase their rewards. There is substantial evidence to suggest that feeling time pressure is linked to violating traffic rules, speeding, and risky behavior while driving (Useche *et al.*, 2025; Salmon *et al.*, 2023) ^[16, 23].

Moreover, financial concerns increase the willingness to take risks. Most fast commerce delivery riders have gig or contract work with unstable income, limited employee benefits, and poor job security. According to the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2017) ^[1], when job demands are high with insufficient financial and organizational resources, increased stress and risky adaptation strategies are produced. The financially-concerned drivers might be willing to undertake extra delivery tasks, increase the number of working hours, and decrease the duration of breaks, which can increase the risk of accidents that can be traced to driver fatigue (Tran *et al.*, 2022; Mao *et al.*, 2025) ^[8, 22]. Furthermore, the absence of a thorough protection of employees and the differences in the regulatory systems contribute even more to this risk. Ride-sharing service providers are often treated as independent contractors instead of employees in most jurisdictions, and therefore, they are not entitled to their accident insurance, workplace safety, and union representation. Even though the recent policy changes of the Indian government, which promises to make the ten-minute deliveries, can be seen as an attempt on behalf of the government, it only scratches the surface of the overall business story and does not consider the deeper dynamics behind ride-sharing behavior, which are based on software design and monetary trends.

To sum up, the data show that the issue of driver well-being is a mutual object in the nexus of urban organization, digital control systems, work relations, and regulation frameworks. An effective solution should be multi-dimensional, not based on marketing rhetoric without the introduction of significant changes.

Practical and Policy Implications

The use of safety performance measures by technology companies should be implemented in their program appraisal. These measurements should not just talk about fast service delivery but also give signs of safe operation, i.e. compliance to traffic laws, wise journey time, and shunning unsafe routes. The safety performance measures can be checked against the safety goals set by evaluative mechanisms that ensure comprehension of the program. All gig delivery workers should be required to be fully insured against accidents by government agencies regardless of the category of employment. This insurance will have to cover medical care, lost job replacement, and loss of income due to injuries at work. Since the risk posed by the road traffic in India is huge in the statistics of fatalities, insurance cannot be chosen by a rider or just be integrated with technology companies; it should be a mutual responsibility of the state and technology companies.

Spending long durations of work is one of the significant predictors of accidents. The measures that can help companies to prevent fatigue include limiting the duration of ride hours each day, the use of scheduled rest breaks, and automatic shutdown of the company equipment after prolonged usage. The same is regularly used by the trucking and aviation sectors to protect the health and safety of the drivers, and this can eliminate fatigue-related accidents to a significant extent. Improving Roads for Scooter Riders. Road modifications are a very pressing requirement.

Designing dedicated roads for scooters, enhanced lighting, repairing damaged roads, and redesigning intersection points can reduce the risk of danger. As a major portion of traffic-related deaths in India is due to scooters, improving the infrastructure for scooter riders is a critical requirement to achieve objectives for job site and overall public safety.

The government must ensure that companies make publicly available anonymous safety data, including the number of incidents, labor periods, and delivery times. Official monitoring can help monitor the effectiveness of companies in adhering to safety regulations and identify any hidden program impacts.

Research Gaps

With the growing amount of research, many areas are still in need of further study. The first step is to focus on the accomplishment of a thorough investigation in India with a particular focus on the cases of courier deliveries on motorcyclists. Current datasets include all types of two-wheel riders, thus, blurring the dissimilar danger profile of the delivery motorcycles using accidents. The future studies ought to consider the safety results after the removal of the ten minutes mandatory delivery time. Even though the change in the policy is expected to lead to safer conditions, it still remains unclear, whether the level of accidents will reduce over time or whether the incentive systems hidden within complex systems can promote dangerous behavior on accident. This, therefore, brings a much-needed controlling research, which isolates and tests particular measures aimed at improving safety protocols.

Most of scholarship is currently based on survey or observation as the methods of data collection. Future studies would determine the effectiveness of different policy interventions, including redesigning complex systems, or introducing restrictions to rider fatigue, or a system of incentives that would encourage safe driving behavior, by applying experimental paradigms that are similar to controlled trials.

Lastly, there is the urgency to conduct interdisciplinary studies that cut across various fields of professional practice. Through the integration of the expertise of engineering concerning the dynamics of the vehicle, occupational health, behavioral economics, and regulation of the digital system, researchers can reach a more subtle view of risk constructions.

Conclusion

Quick commerce has altered the way people place orders in the downtown area by incorporating speed as a significant factor in competition. However, the focus on speed has resulted in several occupational risks for individuals making deliveries, particularly in a busy road environment like India. Evidence from that country indicates that individuals on motorbikes are at a higher risk of being involved in lethal accidents, making delivery personnel a rather dangerous traffic environment.

While official actions, such as halting the promotion of the delivery window for fifteen minutes, are helpful initial responses, they do not address the underlying issues associated with the management of systems via algorithms and gig economy work. For the well-being of riders to truly improve over time, significant changes are required in the way these algorithms are designed, labor policies, insurance policies, and the development of supportive infrastructure.

Lastly, ensuring that riders in the quick commerce sector are safe should not be considered a matter of personal concern but rather a concern associated with system design. It is important to ensure that the goals of online platforms are aligned with public health and road safety initiatives to ensure that the promotion of speed does not lead to the loss of life.

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