

INFORMAL TRAFFIC SIGNALS AND ROAD SAFETY GOVERNANCE IN SOUTHEAST ASIAN CITIES

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Abstract. Road safety remains a major challenge in motorcycle-dominant cities across Southeast Asia, where dense mixed traffic requires continuous negotiation among road users. This study examines how informal traffic communication practices among motorcyclists function as culturally interpreted coordination mechanisms in urban traffic environments. Using a mixed-method approach, the research integrates survey data from 834 Malaysian motorcyclists with comparative observation from Indonesia, Vietnam, and Bangladesh, complemented by stakeholder focus group insights. The findings show that riders routinely employ several informal signalling practices, including polite horn taps, head nods, hand gestures, and empathetic yielding behaviours. Among these, yielding behaviour and short horn signals emerged as the most common coordination strategies for managing uncertainty and avoiding conflict. Respondents also strongly agreed that informal interaction improves traffic flow, reduces misunderstanding, and contributes to safer road environments. Cross-country comparison indicates that the interpretation and intensity of such signals vary across traffic cultures, suggesting that informal communication operates as a locally embedded behavioural system rather than a universal rule. The study argues that integrating behavioural communication awareness into rider education and urban transport policy could enhance safety outcomes in motorcycle-dense cities. By framing traffic interaction as a social communication process, the research contributes to broader efforts supporting SDG 3 Good Health and Well-Being through the reduction of traffic accidents, and SDG 11 Sustainable Cities and Communities through safer and more inclusive urban transportation systems.

Keywords: *informal traffic communication, motorcycle interaction behaviour, urban traffic culture, traffic accidents, sustainable transportation*

Introduction

Motorcycles are not a peripheral feature of urban transport in Southeast Asia. They are the dominant mode of movement for millions of daily commuters in Malaysia, Indonesia, Vietnam, and Bangladesh. In these settings, traffic is dense, heterogeneous, and fast-moving, and formal road rules cannot fully regulate the continuous micro-negotiations that occur between road users at intersections, merging zones, and filtering lanes (Sagala et al., 2025; Das et al., 2025; Djunaidi et al., 2024; Vu et al., 2023). Riders must make constant judgements about right of way, spatial proximity, and the intentions of surrounding vehicles, often within fractions of a second (Dey et al., 2021; Rasouli et al., 2017). Road safety policy has historically responded to this challenge through enforcement, infrastructure improvement, and standardised rider training (World Health

Organization, 2026; World Health Organization, 2023; MTM, 2022). These approaches have genuine value, but they leave an important dimension of traffic behaviour unaddressed. In practice, road users in motorcycle-dense cities rely extensively on informal communication signals: short horn taps, head nods, hand gestures, and yielding manoeuvres that convey awareness, intention, courtesy, and caution (Nguyen et al., 2025; Yu et al., 2023; Onkhar et al., 2022; Dey et al., 2021; Rasouli et al., 2017). These behaviours are not codified in any traffic regulation, yet they appear to structure the day-to-day coordination of movement in ways that affect both safety and traffic fluency.

What makes this particularly significant is the cultural dimension. Informal traffic signals do not carry universal meaning. A short horn tap that functions as a polite presence signal in Kuala Lumpur may carry a different social weight in Jakarta or Dhaka. A hand gesture that signals gratitude in Malaysian traffic may be ambiguous in Vietnamese traffic culture. This means that informal communication in traffic is not simply a behavioural phenomenon. It is a socially and culturally interpreted system, and its safety value depends on whether road users share enough common understanding to read each other correctly (Nævestad et al., 2022; Nævestad et al., 2020; Goffman, 2017). This study examines how informal traffic communication practices among motorcyclists function as culturally interpreted coordination mechanisms and what those practices mean for road safety governance in urban Southeast Asian contexts. It draws on survey data from 834 Malaysian motorcyclists, comparative observations from Indonesia, Vietnam, and Bangladesh, and stakeholder focus group insights to build a multi-layered picture of informal signalling in motorcycle-dominant traffic. The study connects its findings to two Sustainable Development Goals: SDG 3 Good Health and Well-Being, through the relationship between communication practices and accident reduction, and SDG 11 Sustainable Cities and Communities, through the link between safer traffic interaction and more inclusive urban mobility systems.

The study pursues four objectives. First, to identify the informal traffic communication practices most commonly used by Malaysian motorcyclists and assess their perceived effectiveness. Second, to compare these practices across four Southeast Asian countries and examine how cultural context shapes their meaning and intensity. Third, to evaluate the relationship between informal communication and perceived safety outcomes among riders. Fourth, to generate policy-relevant recommendations for integrating behavioural communication awareness into road safety education and urban transport governance.

Literature review and theoretical framework

Informal communication as a traffic coordination mechanism

Traffic interaction is not governed by formal rules alone. Road users continuously interpret and produce informal signals that help them coordinate movement in real time. Rasouli et al. (2017) show that road users rely on subtle behavioural cues to reach mutual understanding in dynamic traffic contexts, particularly where movement decisions must be made rapidly and formal signalling systems are insufficient. Dey et al. (2021) found that explicit verbal communication is rare in everyday traffic, but road users nonetheless interpret a wide range of implicit signals through movement, body positioning, and gaze. These signals operate beneath the level of formal regulation, yet they appear to matter substantially for how traffic flows and conflicts are managed. In motorcycle-dominant traffic, the stakes of this informal signalling are especially high.

Riders are physically exposed, more sensitive to close-range interaction, and more dependent on rapid negotiation with surrounding vehicles than car drivers. Research consistently shows that risky riding behaviour, poor hazard anticipation, and disruptive manoeuvring are strongly associated with crash risk (Sagala et al., 2025). What is less well understood is the countervailing role of communicative behaviour: the gestures, horn patterns, and yielding practices through which riders may reduce uncertainty and manage proximity more safely.

Cultural interpretation of traffic signals

Traffic culture shapes how informal signals are produced and understood. What functions as a polite coordination cue in one urban traffic system may be received as aggressive or ambiguous in another. Nguyen et al. (2025) demonstrate that horn use in Ho Chi Minh City carries multiple functional meanings depending on acoustic form and timing, including presence signalling, warning, and movement coordination. Tsunekawa et al. (2018) similarly found that horn use at intersections in Taipei serves situational communicative functions rather than purely emotional ones. By contrast, studies from Bangladesh show that uncontrolled horn use becomes harmful when linked to anger, weak regulation, and noise-related health impacts (Islam et al., 2024; Kabir et al., 2024). This variation matters because it complicates any straightforward claim that informal communication is uniformly beneficial or harmful. Its safety value is mediated by cultural interpretation: whether the intended meaning of a signal matches the received meaning depends on shared conventions within a traffic culture. In heterogeneous traffic systems, where riders from different areas, occupational backgrounds, and experience levels interact, those conventions may not always be shared. Understanding where they align and where they diverge is therefore a prerequisite for meaningful policy intervention.

Yielding, visual acknowledgement, and prosocial riding

Yielding behaviour occupies a distinctive position in traffic interaction because it combines a functional purpose with a social meaning. Formally, yielding is a right-of-way allocation. Socially, it is a communicative act that signals awareness, accommodation, and cooperative intent. Yu et al. (2023) found that altruism is positively associated with prosocial driving behaviour and yielding attitudes, suggesting that the disposition to give way is partly a reflection of cooperative values rather than only a compliance response. Ren et al. (2019) similarly conceptualise effective traffic behaviour around empathy and anticipation, meaning that safe movement involves reading the probable intentions of others rather than asserting priority alone. Visual acknowledgement performs a related function. Onkhar et al. (2022) found that eye contact and directional gaze increase perceived safety among pedestrians by reducing uncertainty about whether a driver has noticed them. This effect is especially relevant for motorcyclists, whose smaller profile and higher physical exposure create continuous uncertainty about whether surrounding drivers have registered their presence. Head nodding, brief eye contact, and directional gaze cues can reduce this uncertainty quickly and without requiring the rider to interrupt vehicle control.

Road safety culture and SDG framing

Road safety outcomes are shaped not only by traffic engineering and enforcement but also by the normative environment in which road users operate. Nævestad et al. (2022) argue that values and norms toward risk and freedom influence accident risk independently of formal rule compliance, which implies that safety behaviour is partly embedded in broader cultural systems. Informal communication practices, when widely shared and consistently interpreted, may function as part of that normative environment: learned scripts that reduce ambiguity and support cooperative traffic behaviour. At the policy level, the Sustainable Development Goals provide an important framing for this discussion. SDG 3 Good Health and Well-Being includes a specific target to halve the number of global deaths and injuries from road traffic crashes by 2030. SDG 11 Sustainable Cities and Communities calls for safe, inclusive, and sustainable urban transport. Both goals are directly relevant to motorcycle safety in Southeast Asian cities, where road deaths are disproportionately high and where motorcycles are central to low-income urban mobility. Incorporating behavioural communication awareness into road safety education and urban governance is consistent with both goals and represents a low-cost, culturally grounded intervention strategy.

Theoretical positioning

Three theoretical frameworks inform the interpretation of findings in this study. First, the theory of planned behaviour (Ajzen, 1991) holds that attitudes, perceived subjective norms, and perceived behavioural control jointly influence behavioural intentions and actions. Applied to informal traffic communication, this framework suggests that riders' use of gestures, horn signals, and yielding behaviour is shaped not only by personal preference but by perceived social expectations within local traffic culture. Second, Goffman's interaction ritual theory (Goffman, 2017) proposes that repeated face-to-face encounters generate predictable behavioural scripts through mutual attention and situational cues. In traffic, this helps explain why informal signals are recognisable and effective: they are socially rehearsed through repeated encounters. Third, road safety culture research (Nævestad et al., 2022, 2020) emphasises that safety outcomes reflect shared values and behavioural norms, not only technical rule systems. Together, these frameworks support the view that informal traffic communication is a socially patterned, culturally embedded, and policy-relevant phenomenon.

Materials and Methods

The study adopted a mixed-method design with a quantitatively dominant structure and an embedded comparative-qualitative component. This design was appropriate given the dual focus of the research: quantitative survey data were needed to assess the prevalence and perceived effectiveness of informal communication practices among riders, while qualitative and comparative methods were needed to interpret how those practices operate across different traffic cultures and institutional contexts. The approach reflects a pragmatic mixed-methods orientation where design is driven by the problem structure and the types of evidence required (Tashakkori and Teddlie, 2010). Survey data were collected from 834 motorcycle riders at multiple locations in Malaysia, including urban and suburban environments across the Klang Valley and selected regional centres. Respondents were recruited through purposive and convenience sampling at traffic observation sites, motorcycle parking areas, and community gathering points. The instrument covered four domains of informal

communication behaviour: hand gestures, polite horn use, visual acknowledgement, and empathetic yielding. Additional items measured perceived effectiveness outcomes including misunderstanding avoidance, safety contribution, traffic flow improvement, and support for training integration. A separate psychological safety block measured confidence, calmness, comfort when sharing the road, and stress reduction. Descriptive statistics, one-way ANOVA, Welch's ANOVA, and chi-square tests were used for quantitative analysis.

The comparative component drew on secondary literature, observational accounts, and documented traffic studies from Indonesia, Vietnam, and Bangladesh to examine how informal traffic signals are used and interpreted across different Southeast Asian traffic cultures. Countries were selected based on their high motorcycle density, available literature on urban traffic behaviour, and representativeness of different regulatory and cultural environments within the region. The comparison was thematic rather than based on harmonised multinational survey data, which is a recognised limitation, but it provides a meaningful contextual layer for interpreting the Malaysian findings. Focus group discussions were conducted with stakeholders including road safety educators, enforcement personnel, and senior riders. These sessions explored institutional perspectives on informal traffic interaction, views on the appropriateness of incorporating such practices into formal training, and observations about rider behaviour in diverse traffic conditions. The qualitative data from these sessions were used to triangulate survey findings and enrich the policy discussion rather than to generate independent thematic coding.

Results and Discussion

Informal communication practices among Malaysian riders

Table 1 presents the mean scores for the principal categories of informal communication behaviour reported by riders. The results show a consistent pattern: courtesy-based and accommodation-oriented practices were stronger than purely directional signalling. Empathetic yielding and head nodding recorded the highest mean values, while hand signals for lane change were more moderate. This pattern suggests that the informal communication system in Malaysian motorcycle traffic is primarily relational in character. Riders appear to use these practices not only to convey movement intention but to manage the social texture of shared road space. The prevalence of empathetic yielding and visual acknowledgement as dominant practices is consistent with the theoretical expectation that informal communication in motorcycle traffic performs a relational function beyond mere directional signalling. Yu et al. (2023) link yielding behaviour to altruistic orientation, and the present data support that connection: riders give way not only because they must but because doing so signals social awareness and reduces the risk of friction in shared space. The comparative strength of head nodding over direct eye contact reflects practical constraints: helmet visors, approach angles, and speed limit the feasibility of sustained eye contact, making brief nodding the more efficient acknowledgement cue.

Table 1. Mean scores for informal communication practices ($N = 834$).

Communication practice	Mean (1 to 5)	Primary function
Hand signal: lane change	3.42	Directional intent
Hand signal: giving way	3.68	Space allocation

Hand signal: appreciation	3.71	Social acknowledgement
Short polite horn signal	3.59	Presence and warning
Head nodding / visual cue	3.89	Mutual recognition
Empathetic yielding	3.94	Cooperative accommodation

Perceived effectiveness of informal communication

Table 2 presents descriptive statistics for rider evaluations of informal interaction effectiveness. All five items recorded mean scores above 3.77 on a five-point scale, indicating consistently positive assessments across the sample. The highest means were recorded for improving traffic flow and supporting inclusion in formal training modules. The result for training support is particularly noteworthy: nearly three-quarters of respondents agreed or strongly agreed that informal communication practices should be incorporated into rider education, suggesting that riders themselves see these behaviours as institutionally legitimate and educationally relevant. The strong result for traffic flow improvement deserves attention because it shows that riders connect informal communication with efficiency as well as safety. Ambiguity in traffic does not only cause accidents; it also causes hesitation, abrupt braking, and disrupted flow. Practices that reduce ambiguity therefore serve dual purposes: they support safer interaction and they enable smoother movement. This dual function makes informal communication especially relevant in dense urban environments where the costs of hesitation and conflict accumulate rapidly.

Table 2. Descriptive statistics: Perceived effectiveness of informal communication ($N = 834$).

Item	Mean	Agree/strongly agree (%)
Making traffic more orderly	3.77	67.1
Avoiding misunderstanding	3.84	68.3
Contributing to safety	3.85	66.9
Improving traffic flow	4.10	77.6
Supporting formal training modules	4.06	74.5

Safety-related outcomes

Table 3 summarises rider responses on safety-related outcomes associated with informal communication. The findings show strong positive associations across both behavioural outcomes (near-miss reduction, accident avoidance) and psychological outcomes (confidence, calmness, comfort, stress reduction). The psychological safety dimension deserves particular emphasis. A common assumption in road safety research is that safety is primarily a physical outcome: crashes, injuries, and violations. The present findings show that safety is also experienced psychologically, and that informal communication contributes to this experience significantly. Riders who feel acknowledged, understood, and accommodated by other road users are more likely to ride with composure and less likely to make defensive or reactive manoeuvres that increase conflict risk. Onkhar et al. (2022) provide evidence that communicative cues influence perceived safety and thereby affect decision-making. The present data extend this logic into the motorcycle context with a large and geographically distributed sample. The polite horn sub-analysis further illustrates the emotional dimension. Among riders who used the horn during the study period, the mean emotional state score before horn use was 2.86 and after horn use was 3.67 on a five-point scale. The mean rating for

the reaction of other road users was 3.40. More than 96 percent of horn events involved one or two short taps; long or aggressive horn use was reported by fewer than four percent. Situationally, horn use was concentrated during dangerous manoeuvring by others (25.3%) and unsignalled lane changes (21.3%), indicating that the behaviour was compensatory and communicative rather than anger-driven. These results align with Nguyen et al. (2025) and Tsunekawa et al. (2018), both of whom identify functional horn signalling as distinct from aggressive horn use.

Table 3. *Safety-related outcomes associated with informal communication (N = 834).*

Outcome	Agree/strongly agree (%)	Mean
Rarely experience near misses	67.6	3.91
Helps avoid accidents	72.2	3.97
Feel more confident when interacting	77.5	4.06
Feel comfortable sharing the road	82.3	4.18
Feel calmer during traffic interaction	83.8	4.22
Experience less riding stress	77.6	4.08

Inferential tests

One-way ANOVA found no statistically significant differences across study locations in perceived effectiveness of informal interaction ($F = 1.796$, $p = .167$) or in perceived safety when using informal signals ($F = 2.147$, $p = .118$). Welch's procedure was applied for variables where Levene's test showed violated homogeneity. The absence of significant location differences indicates that the positive evaluation of informal communication is broadly consistent across study sites rather than concentrated in a particular area, which strengthens the generalisability of findings within similar urban contexts. A chi-square test examining the association between short horn use and accident avoidance perception produced a statistic of 49.034 with 16 degrees of freedom ($p < .001$), confirming a significant association between polite horn use and perceived accident prevention.

Cross-country comparison

Table 4 presents the thematic comparison of informal traffic communication practices across the four countries in the study. The comparison shows that all four countries employ informal signalling, but the meaning, intensity, and social acceptability of specific practices vary according to local traffic culture, enforcement environment, and urbanisation patterns. The comparative findings point to a central insight: informal communication is a regionally familiar phenomenon but a locally interpreted one. All four countries show evidence of informal signalling as a coordination mechanism. However, the specific practices that carry positive safety associations in one context may be neutral or negative in another. In Bangladesh, for example, horn use is associated with both functional signalling and excessive noise pollution linked to health risk (Islam et al., 2024; Kabir et al., 2024), whereas in Malaysia the same basic practice appears predominantly constructive when restricted to short, non-aggressive taps. In Vietnam, the combination of horn and gesture functions as a reinforced communication signal in congested conditions (Nguyen et al., 2025), whereas in Indonesia the emphasis is on directional hand signalling as a space-allocation tool in dense two-wheeler flows (Djunaidi et al., 2024). These differences have direct implications for road safety governance. A one-size-fits-all behavioural

communication intervention would likely fail in the region because it would disregard the cultural specificity through which informal signals acquire meaning. Effective policy must be locally anchored: it needs to identify which practices within a given traffic culture are consistently interpreted as constructive, clarify their appropriate use, and build those practices into rider education as culturally recognisable competencies rather than imported rules.

Table 4. *Cross-country comparison of informal traffic communication practices.*

Country	Dominant practice	Cultural interpretation	Noted risk
Malaysia	Head nodding, short horn, yielding	Polite coordination; broadly positive	Ambiguity in multi-lane merging
Indonesia	Directional hand signals, yielding	Space allocation in dense urban flow	Situational pressure from income targets
Vietnam	Horn with gesture combination	Simultaneous warning and movement cue	Horn dependence in congestion
Bangladesh	Hand signals for caution	Requesting space; requesting right of way	Excessive horn use linked to noise risk

Stakeholder focus group insights

Focus group participants, including road safety educators and enforcement personnel, recognised the practices identified in the survey data and confirmed their presence in everyday traffic interaction. Several key themes emerged from these sessions. First, participants acknowledged that informal communication is currently invisible in official training curricula, even though instructors and enforcement officers observe it regularly. Second, participants expressed support for incorporating selected practices into training, particularly visual acknowledgement and short horn use, provided that the framing emphasised appropriate use rather than endorsing ambiguous or unsafe improvisation. Third, participants noted that the distinction between constructive informal communication and problematic behaviour is often situational: the same gesture or horn signal can serve a coordination function in one context and an aggressive function in another, and training should help riders develop the contextual judgement to recognise the difference. These insights align with the broader literature on behaviour-based road safety education. Setyowati et al. (2025) found that interactive and socially grounded safety education for riders is more effective when it connects formal knowledge with real-world traffic situations and social decision-making. The present focus group data suggest that there is institutional readiness within Malaysian road safety education to move in this direction, provided that the content is carefully designed and contextually anchored.

Three concrete recommendations follow from the findings. First, road safety training curricula in Malaysia and comparable Southeast Asian countries should incorporate modules on informal traffic communication. These modules should identify specific practices with documented positive associations, provide guidance on appropriate use in different traffic contexts, and help riders develop the contextual judgement to distinguish constructive signalling from ambiguous or aggressive behaviour (Setyowati et al., 2025). Second, public awareness campaigns should address the communicative dimension of motorcycle safety directly. Messages that frame road courtesy as a safety strategy, rather than only a social nicety, would reinforce the practices already in use among riders and help extend them to a broader population of road users. Third, regional transport governance bodies should consider supporting comparative research on informal traffic communication using harmonised instruments across countries. The thematic comparison in this study is a starting point, but it cannot substitute for

coordinated data collection that would allow stronger cross-national testing of how traffic culture shapes communication and safety outcomes.

Several limitations should be acknowledged. The study is cross-sectional and cannot establish causal relationships between informal communication practices and crash outcomes. The Malaysian survey relies on self-report, which carries risks of social desirability bias. The cross-country comparison is thematic rather than based on harmonised survey data, limiting the precision of cross-national conclusions. The focus group component involved a relatively small stakeholder sample and should not be treated as representative of national institutional opinion. Future research should pursue observational designs that record actual traffic interaction in real time at intersections and merging zones, longitudinal designs that track whether consistent use of constructive communication practices is associated with different safety trajectories, and experimental designs that test how riders from different cultural backgrounds interpret specific gestures and horn signals under controlled conditions. Policy evaluation studies should assess whether incorporating behavioural communication content into training or awareness campaigns produces measurable changes in rider behaviour and safety perceptions. Comparative research using harmonised multinational instruments would allow stronger testing of how traffic culture shapes the meaning and safety value of informal communication across the region.

Conclusion

This study set out to examine how informal traffic communication practices among motorcyclists function as culturally interpreted coordination mechanisms and what those practices mean for road safety governance in Southeast Asian cities. The findings give a clear answer across four dimensions. First, informal communication is a structured and widespread feature of Malaysian motorcycle traffic. Riders draw from a recognisable repertoire of practices: head nodding, short horn signals, hand gestures for giving way and appreciation, and empathetic yielding. These practices are not random. They are organised around courtesy, accommodation, and mutual recognition, and they reflect a road culture in which the management of shared space requires more than formal rule compliance (Yu et al., 2023; Nævestad et al., 2022; Dey et al., 2021; Rasouli et al., 2017). Second, informal communication is consistently associated with positive safety and traffic outcomes. Riders link these practices to fewer near-miss situations, greater accident avoidance, improved traffic flow, reduced misunderstanding, and stronger psychological safety. The psychological dimension, covering confidence, calmness, comfort, and stress reduction, is especially important because it shows that informal communication shapes how riders experience and respond to the traffic environment, not only how they physically navigate it (Onkhar et al., 2022; Bellet et al., 2022). Third, the cross-country comparison reveals that informal signalling is regionally common but culturally specific. Malaysia, Indonesia, Vietnam, and Bangladesh all show evidence of informal coordination practices, but the meaning, intensity, and safety value of specific signals vary by traffic culture (Nguyen et al., 2025; Das et al., 2025; Sagala et al., 2025; Djunaidi et al., 2024; Islam et al., 2024; Kabir et al., 2024; Vu et al., 2023). This finding argues against universal policy prescriptions and in favour of locally anchored interventions that build on culturally recognisable practices. Fourth, the findings carry direct implications for road safety governance aligned with SDG 3 and SDG 11. Integrating behavioural communication awareness into rider education, public

awareness campaigns, and urban transport policy is feasible, culturally grounded, and supported by riders themselves. Nearly three-quarters of survey respondents favoured including informal communication in formal training modules. Enforcement personnel and educators recognise these practices and acknowledge their role in everyday traffic interaction.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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