

The Effectiveness of Highway Code Enforcement in a Resource-Constrained Setting: The Case of Dili City, Timor-Leste

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ABSTRACT

Effective motor vehicle regulation is critical for public safety, yet it faces severe challenges in resource-constrained settings like Dili, Timor-Leste. This study evaluates the effectiveness of Highway Code (Decreto-Lei n.º 6/2003) enforcement in the city. Employing a qualitative empirical legal research approach, data were collected via non-participant observation and semi-structured interviews with Traffic Police, road users, and officials, then analyzed using thematic analysis. Findings reveal a stark systemic imbalance: only 78 Traffic Police personnel are tasked with regulating over 40,000 daily vehicles. This severe human resource deficit, compounded by deteriorating physical infrastructure and manual control systems, forces reactive policing. Consequently, it erodes procedural justice, leading to widespread public non-compliance and a weak road safety culture. The study demonstrates that conventional manpower expansion alone is insufficient to bridge this enforcement gap. Instead, a “technological leapfrogging” strategy—specifically the implementation of Electronic Traffic Law Enforcement (ETLE)—coupled with data-driven deployment and targeted civic education, is essential. This integrated approach is crucial to bypass resource limitations, restore legal legitimacy, and foster a sustainable culture of road safety in Dili.

Keywords: Traffic Law Enforcement, Road Safety Culture, Empirical Legal Research, Highway Code, Timor-Leste.

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1. INTRODUCTION

Road traffic safety remains a critical global public health and governance challenge. According to the World Health Organization (World Health Organization, 2023), road traffic injuries continue to be the leading cause of death for children and young adults aged 5–29 years worldwide, with a disproportionate burden borne by low- and middle-income countries. The Global Road Safety Facility (Global Road Safety Facility, 2023) emphasizes that rapid motorization in developing nations, when not matched by robust regulatory frameworks and adequate infrastructure, significantly exacerbates road safety risks. In this context, effective traffic regulation is not merely a technical transportation issue, but a fundamental pillar in maintaining public order and protecting the human right to safe mobility.

In Timor-Leste, particularly in the capital city of Dili, traffic dynamics have undergone drastic changes over the past decade. The rapid growth in motor vehicle ownership is driven by the population’s increasing mobility needs for economic, social, and educational activities. However, this surge has not been paralleled by proportional road infrastructure development, leading to chronic congestion and a rising frequency of traffic accidents (Asian Transport Observatory, 2022). Recent data highlights the severity of this issue: the National Police of Timor-Leste (PNTL) reported 2,218 road accidents involving personal injuries and 117 fatalities in 2024 alone (PreventionWeb / UNDRR, 2024). Furthermore, the United Nations Special Envoy for Road Safety highlighted during a 2024 mission to Timor-Leste that 28% of global road traffic fatalities occur in low-income countries, urging immediate, structured policy interventions to ensure safer mobility in Dili (United Nations

Timor-Leste, 2024).

The primary legal foundation for traffic regulation in the country is Decreto-Lei n.º 6/2003, commonly known as the Código da Estrada (Highway Code) of Timor-Leste (Ministério da Justiça, 2003). This decree mandates the PNTL, specifically the Traffic Police (Polícia de Trânsito Segurança Rodoviária), to regulate and supervise all motor vehicle circulation authorized by the National Directorate of Land Transportation (DNTT). The effectiveness of this regulation heavily depends on the officers' comprehension of their duties and their capacity to ensure public comfort and safety. As Asshiddiqie (2006) asserts, compliance with legal norms cannot be achieved solely through the existence of statutory text; it requires consistent application and enforcement mechanisms by state apparatuses. Crucially, in the context of Timor-Leste—a young, post-conflict democracy—traffic regulation transcends mere logistical management. It represents a critical nation-building challenge and a socio-legal test of the state's capacity to internalize modern, formal legal norms within a society that is still transitioning from traditional, communal practices to structured state governance.

However, in practice, the Traffic Police in Dili face severe structural and operational constraints. The most critical issue is the stark imbalance between human resources and traffic volume. Field data indicates that the Traffic Section in Dili is supported by only 78 personnel. This number is grossly inadequate to supervise and regulate the tens of thousands of motor vehicles operating daily, let alone monitor the numerous congestion and accident-prone hotspots across the city. Research on traffic enforcement in developing countries confirms that limited human resources and fragmented data directly hinder the effectiveness of police patrols and consistent law enforcement on the ground (Giri, 2024). Effective human resource management is essential for any organization to process inputs and produce optimal outputs (Fachrurazi, 2021), and the current personnel deficit severely compromises the PNTL's operational capacity.

Secondly, physical infrastructure and technological support remain minimal. Facilities such as functional traffic lights, CCTV surveillance, road markings, and pedestrian crossings are either damaged, manually operated, or entirely absent. To bridge this gap, this study proposes a technological leapfrogging strategy. Rather than relying solely on traditional, resource-intensive manpower expansion, the adoption of digital enforcement technologies, such as Electronic Traffic Law Enforcement (ETLE), serves as a disruptive innovation. Studies indicate that ETLE can bypass chronic human resource deficits by shifting the paradigm from manual, subjective policing to objective, technology-driven compliance monitoring (Mashdurohatun & Yasir, 2022; Suwandi, 2023). ETLE not only enhances the objectivity of violation evidence but also alleviates the operational burden on field officers who are chronically understaffed.

Beyond institutional and infrastructural limitations, a crucial socio-cultural challenge persists: the low level of public legal awareness and safety culture. Many road users in Dili continue to disregard the regulations outlined in the Highway Code, reflecting a lack of civic education regarding traffic ethics. Understanding pedestrian and driver behavior, alongside fostering a robust road safety culture, is essential for improving traffic safety in developing nations (Traffic Safety Research, 2022; Wealthy, 2018). To analyze this phenomenon, this study utilizes Tyler's (2006) procedural justice theory as its primary analytical lens. Tyler posits that public compliance with the law stems not merely from the fear of sanctions, but from the perception that the enforcing authority is legitimate and its procedures are fair. In Dili, the chronic shortage of personnel (78 officers) leads to sporadic and inconsistent enforcement. Through the lens of procedural justice, this inconsistency inadvertently signals to the public that the law is negotiable, thereby eroding the perceived fairness and authority of the Traffic Police. When enforcement is perceived as arbitrary or absent, the law loses its binding force (legal force) in the eyes of the public.

While previous studies have extensively examined traffic management in developed nations or resource-rich developing cities, there is a distinct paucity of empirical legal research focusing on highly resource-constrained, post-conflict settings like Dili. Most existing literature treats traffic enforcement as a purely technical or administrative issue. This study departs from that approach by framing traffic regulation as a complex socio-legal phenomenon where human resource deficits, infrastructural gaps, and procedural justice intersect. By doing so, it offers a novel conceptual understanding of how legal compliance is negotiated in environments where state capacity is severely limited.

Therefore, this study aims to analyze the effectiveness of motor vehicle regulation based on the Highway Code in this resource-constrained setting, identify the primary inhibiting factors (specifically the limitation of

78 personnel, infrastructural deficits, and safety culture), and formulate actionable strategic solutions. This research is expected to provide both academic and practical contributions to the PNTL and policymakers in modernizing traffic management to create a safer, more orderly, and sustainable urban environment in the City of Dili.

2. RESEARCH METHODS

This study employed a qualitative empirical legal research approach, specifically utilizing a socio-legal framework, to examine the real-world effectiveness of motor vehicle regulation conducted by Traffic Police officers in the City of Dili, Timor-Leste. Unlike normative legal research that focuses solely on doctrinal analysis of statutory texts, empirical legal research investigates how law operates in society by examining actual legal behavior, law enforcement practices, and the implementation of legal norms in everyday life (Muhaimin, 2020). This methodological choice is particularly appropriate for studying a resource-constrained setting, as it allows for a comprehensive understanding of the gap between formal legal mandates and practical enforcement realities. Specifically, this research evaluated the enforcement of Decreto-Lei n.º 6/2003 (the Highway Code) and assessed the multifaceted factors affecting traffic management and road safety in the capital city, with particular attention to how institutional limitations shape regulatory outcomes.

The research was conducted in the City of Dili, focusing on the operational areas of the Traffic Section (Polícia de Trânsito Segurança Rodoviária) of the National Police of Timor-Leste (PNTL). Given the specific constraint of only 78 personnel assigned to traffic regulation in the city, participants were selected using a purposive sampling technique to ensure the inclusion of information-rich cases that could provide deep insights into the enforcement challenges (Palinkas et al., 2015). The primary respondents consisted of three distinct groups: first, Traffic Police officers actively involved in daily traffic regulation and control, who could speak to operational constraints and enforcement dilemmas; second, road users including motorcycle drivers, car drivers, and pedestrians directly affected by traffic enforcement, whose perspectives revealed public compliance behavior; and third, key informants including government officials and transportation authorities possessing policy-level knowledge of traffic management in Dili, who provided contextual understanding of institutional capacity and regulatory frameworks.

Data collection utilized both primary and secondary sources to ensure comprehensive analysis and validity. Primary data were collected through two main techniques: direct non-participant observation and semi-structured in-depth interviews. Direct non-participant observation was conducted at major congestion-prone intersections and accident hotspots in Dili to assess actual traffic conditions, driver behavior, and the functionality of physical infrastructure such as traffic lights and road markings. Complementing these observations, semi-structured in-depth interviews were conducted with the aforementioned respondents to explore their perceptions, challenges, and experiences regarding law enforcement and compliance with the Highway Code. Secondary data were obtained through a systematic document analysis of relevant legislation, primarily Decreto-Lei n.º 6/2003, as well as official PNTL statistical reports, government publications, academic journals, and international reports from organizations such as the World Health Organization and the United Nations related to traffic regulation and transportation management.

The collected data were analyzed using a qualitative descriptive approach, following a systematic process of data reduction, data display, and conclusion drawing. To ensure the validity and reliability of the findings, methodological triangulation was applied by cross-verifying the interview transcripts with field observation notes and secondary documentary evidence, thereby strengthening the credibility of the interpretations (Carter et al., 2014). Thematic analysis was then utilized to identify recurring patterns and core challenges, specifically regarding human resource limitations, infrastructural deficits, and public safety culture (Braun & Clarke, 2006). This analytical approach allowed for the emergence of nuanced insights into how resource constraints intersect with enforcement practices and public behavior. Finally, these findings were synthesized to formulate actionable, evidence-based recommendations for improving road safety and modernizing traffic management in the City of Dili, with implications for other resource-constrained urban settings facing similar governance challenges.

3. RESULTS AND DISCUSSION

3.1. The Reality of Enforcement: A Systemic Imbalance Between Mandate and Capacity

Applying a systems approach to organizational effectiveness reveals a stark asymmetry between the inputs available to the Traffic Police and the outputs required by the city's demands. The primary input for traffic regulation is human capital. However, empirical data collected in the Municipality of Dili reveals a critical bottleneck: the Traffic Section operates with only 78 personnel. This number is grossly disproportionate to the operational reality, where approximately 40,441 motor vehicles navigate the city daily amidst a dense population of 277,240 residents (Pemerintah Kota Dili, 2023).

This severe human resource deficit directly impacts the transformation process of law enforcement. As noted by Giri (2024), limited personnel in developing contexts inevitably lead to fragmented patrols and reactive, rather than preventive, policing. Field observations confirm that with only 78 officers, the police can only maintain a presence at a few major intersections, leaving numerous accident-prone hotspots unmonitored. Consequently, the output of this strained system is a measurable increase in traffic violations and accidents, as the sheer volume of vehicles overwhelms the limited supervisory capacity. Effective human resource management is foundational to organizational output (Fachrurazi, 2021), and the current deficit fundamentally compromises the PNTL's ability to execute the mandate of Decreto-Lei n.º 6/2003.

3.2. Infrastructural Deficits and the Erosion of Procedural Justice

Beyond human resources, the physical and technological infrastructure supporting traffic regulation in Dili remains critically underdeveloped. Essential facilities such as synchronized traffic lights, CCTV surveillance networks, clear road markings, and pedestrian crossings are either dysfunctional, manually operated, or entirely absent. This infrastructural decay forces officers to rely on manual, physical direction of traffic, which is both inefficient and hazardous.

More importantly, this lack of infrastructure has profound socio-legal implications when viewed through the lens of Procedural Justice Theory (Tyler, 2006). Tyler posits that public compliance relies on the perception that legal authority is legitimate and its procedures are fair and consistent. In Dili, the inability to enforce the law consistently—due to the combined lack of 78 personnel and functional monitoring tools—creates an environment of sporadic enforcement. As one senior Traffic Police officer noted during an interview, *“We are stretched too thin. We can only react to accidents or major jams; we cannot proactively enforce the rules everywhere, which makes drivers feel they can break the rules when we are not looking.”* This inconsistency inadvertently signals to the public that the law is negotiable and dependent on the physical presence of an officer, thereby eroding the perceived legitimacy and binding force of the Highway Code.

3.3. The Socio-Cultural Dimension: Weak Safety Culture and the Need for Civic Education

The empirical findings also highlight a deeply rooted socio-cultural challenge: a pervasive lack of road safety culture among the populace. While definitions of safety culture emphasize shared values and behavioral norms that prioritize safety (Wealthy, 2018), the reality in Dili reflects a disconnect between formal legal norms and everyday driving behavior.

This deficiency is intrinsically linked to gaps in both formal and non-formal civic education. Traffic safety is rarely integrated comprehensively into the educational curriculum or community outreach programs. Consequently, many road users view traffic regulations not as essential safety protocols, but as optional guidelines or mere obstacles. Field interviews with road users revealed a common sentiment that compliance is driven solely by the fear of immediate sanctions rather than an internalized ethical commitment to collective safety. This aligns with broader observations in developing nations, where a lack of structured civic education perpetuates unsafe driving behaviors and diminishes respect for traffic regulations (Traffic Safety Research, 2022). Without a foundational shift in public mindset, top-down enforcement will continuously face resistance and evasion.

3.4. Strategic Interventions: Technological Leapfrogging and Institutional Reform

To address these multifaceted challenges, this study identifies the need for strategic, multi-dimensional interventions that move beyond conventional, resource-heavy approaches.

First, at the institutional level, the PNTL, in coordination with the Ministry of Interior, must prioritize the strategic reallocation and augmentation of traffic personnel. As emphasized by the Commander of the

Traffic Section, *“The addition of personnel in the field is urgently needed to regulate and control motor vehicle movements, preventing accidents and congestion at vulnerable points.”* However, given budgetary constraints, simply hiring more officers is a slow process.

Therefore, the most viable and novel solution is technological leapfrogging through the accelerated implementation of Electronic Traffic Law Enforcement (ETLE). Rather than attempting to incrementally build a massive manual enforcement apparatus, Dili can bypass this limitation by adopting digital monitoring. Studies confirm that ETLE serves as a disruptive innovation, shifting the paradigm from subjective, manpower-dependent policing to objective, continuous, and technology-driven compliance monitoring (Mashdurohatun & Yasir, 2022; Suwandi, 2023). ETLE directly mitigates the 78-personnel deficit by acting as a force multiplier, providing irrefutable evidence of violations (e.g., running red lights, helmet non-compliance) without requiring an officer to be physically present at every intersection.

However, for ETLE to be effective and perceived as legitimate (Tyler, 2006), it must be accompanied by robust public awareness campaigns. The government must reframe ETLE not as a revenue-generating penalty system, but as an impartial, life-saving mechanism designed to protect all road users. Coupled with the rehabilitation of basic physical infrastructure (e.g., repairing traffic lights and zebra crossings) and the intensification of non-formal civic education, this integrated approach can foster a sustainable culture of road safety in the City of Dili.

3.5. The Disproportionate Vulnerability of Non-Motorized and Two-Wheeled Road Users

The empirical data reveals that the consequences of ineffective traffic regulation are not distributed equally; they disproportionately affect vulnerable road users, particularly motorcyclists and pedestrians. In Dili, motorcycles constitute the vast majority of the 40,441 daily vehicles, yet they are the most frequent victims of traffic accidents. The severe limitation of 78 traffic personnel means that proactive protection for these vulnerable groups is virtually non-existent. Field observations indicate a critical lack of enforced dedicated motorcycle lanes or safe pedestrian crossing zones. Consequently, pedestrians are forced to rely entirely on the voluntary courtesy of drivers, a reliance that is frequently breached due to the aforementioned low safety culture. According to the World Health Organization (World Health Organization, 2023), protecting vulnerable road users requires a “Safe System” approach that anticipates human error through robust infrastructure and strict enforcement. In Dili, the absence of both creates a hazardous environment where the legal right to safe mobility, as mandated by the state, is systematically compromised for the most exposed demographics.

3.6. Police Discretion and the Operational Burden of Resource Constraints

A critical, often overlooked finding of this socio-legal study is the profound operational dilemma faced by the Traffic Police themselves. The extreme disparity between the mandated duties and the available human resources (78 personnel) forces officers into a reactive “firefighting” mode rather than a preventive patrol strategy. To manage the overwhelming workload, officers are compelled to exercise high levels of discretionary enforcement, prioritizing major traffic jams or severe accidents while inevitably overlooking minor but cumulative violations (e.g., minor speeding, lack of signaling, or sidewalk encroachment). While this triage is a necessary survival mechanism for the organization, it carries a severe socio-legal cost. As Tyler (2006) warns in his Procedural Justice Theory, selective or inconsistent enforcement breeds public cynicism. When road users observe that rules are only enforced sporadically or based on an officer’s immediate physical presence, the law is perceived not as a universal standard of justice, but as an arbitrary obstacle. This erosion of perceived legitimacy makes long-term voluntary compliance nearly impossible to achieve.

3.7. Bridging the Socio-Legal Gap: The Co-Production of Traffic Safety Culture

Given the structural and financial realities of Timor-Leste, relying solely on top-down state enforcement is an unsustainable model. The findings suggest that bridging the gap between the formal mandates of Decreto-Lei n.º 6/2003 and actual public behavior requires a paradigm shift toward the “co-production” of public safety. This means that traffic safety cannot be the sole responsibility of the PNLT; it must be internalized as a shared community value. Currently, formal and non-formal civic education regarding traffic ethics remains fragmented and underfunded. To cultivate a genuine safety culture (Wealthy, 2018), the government must collaborate with non-state actors, including local community leaders (*Chefe de Suco*), educational institutions,

and civil society organizations. By integrating traffic ethics into school curricula and leveraging local media for continuous, culturally resonant awareness campaigns, the state can transform traffic regulations from external, punitive rules into internalized moral imperatives. This bottom-up approach is essential to complement the top-down implementation of technologies like ETLE, ensuring that technological enforcement is met with public understanding rather than resistance.

3.8. The Intersection of Formal Law and Informal Norms: A Socio-Legal Reality

A unique finding in the context of Timor-Leste's post-conflict nation-building is the subtle friction between formal state law and informal societal norms. While Decreto-Lei n.º 6/2003 provides a clear, codified framework for right-of-way and traffic conduct, empirical observations in Dili reveal that road users frequently navigate intersections based on informal, negotiated norms rather than formal legal mandates. For instance, the yielding of right-of-way is often determined by vehicle size, perceived social status, or informal mutual agreements among drivers, rather than adherence to traffic signs. This phenomenon reflects a broader socio-legal reality where the "law in action" diverges significantly from the "law in books" (Gardner, 1961; Muhaimin, 2020). The chronic shortage of 78 enforcement personnel exacerbates this normative pluralism, as the absence of consistent state oversight allows informal, and often unsafe, driving habits to become entrenched. Addressing this requires more than just punitive enforcement; it demands a deliberate legal socialization strategy that bridges the gap between formal statutory requirements and the everyday cultural practices of Dili's residents.

3.9. The Imperative of Data-Driven Governance and Evidence-Based Deployment

The effectiveness of any resource-constrained organization hinges on its ability to allocate limited assets strategically. Currently, the deployment of the 78 Traffic Police personnel in Dili appears to be largely reactive and based on historical habituation rather than real-time, data-driven analysis. The Global Road Safety Facility (Global Road Safety Facility, 2023) emphasizes that modern traffic management relies heavily on robust, centralized data systems to identify accident hotspots and optimize patrol routes. However, field findings indicate that the PNTL's traffic data collection remains fragmented, manual, and largely descriptive. Without a sophisticated, digitized Geographic Information System (GIS) or integrated accident database, it is nearly impossible to conduct predictive policing or evidence-based deployment. To maximize the impact of the existing 78 personnel, the institution must transition toward data-driven governance. By systematically mapping high-risk intersections and peak violation hours, the Traffic Section can shift from a scattered, reactive posture to a targeted, preventive strategy, thereby extracting maximum operational efficiency from minimal human resources.

3.10. The Macro-Economic and Public Health Ramifications of Enforcement Gaps

Finally, the inefficacy of highway code enforcement in Dili must be understood not merely as a logistical or administrative failure, but as a profound public health and macro-economic crisis. The reported 2,218 accidents and 117 fatalities in 2024 (PreventionWeb / UNDRR, 2024) represent a massive, albeit often unquantified, drain on the nation's resources. Each severe accident imposes direct costs on the public healthcare system and indirect costs through the loss of productivity, long-term disability, and the psychological trauma inflicted on families. The World Health Organization (World Health Organization, 2023) explicitly frames road traffic injuries as a leading developmental barrier for low-income countries. Therefore, the underfunding of traffic enforcement infrastructure and the stagnation of personnel numbers at 78 officers represent a false economy. Investing in the modernization of traffic management—through ETLE, infrastructure rehabilitation, and civic education—is not merely an expenditure for the police force, but a critical, cost-effective public health intervention that safeguards the human capital and economic stability of Timor-Leste.

3.11. Comprehensive Discussion: Synthesizing Empirical Findings with Existing Literature

The empirical findings of this study regarding the severe resource constraints in Dili's traffic management resonate with, yet distinctly differ from, broader regional challenges documented in existing literature. The critical bottleneck of having only 78 traffic personnel to manage over 40,000 daily vehicles corroborates the findings of Giri (2024), who noted that fragmented human resources in developing nations directly hinder consistent law enforcement. However, this study extends that understanding by highlighting that in Timor-Leste's post-conflict context, this deficit is not merely an operational hurdle, but a fundamental barrier to the

state's nation-building efforts and the internalization of formal legal norms (Asshiddiqie, 2006).

Furthermore, the observed public non-compliance and weak safety culture cannot be simplistically attributed to a lack of civic education alone. Drawing upon Tyler's (2006) procedural justice theory, this study's discussion reveals that public defiance is often a rational response to inconsistent enforcement. When the state lacks the capacity (due to the 78-personnel limit and broken infrastructure) to enforce rules uniformly, the law is perceived as arbitrary. This aligns with the warnings of Traffic Safety Research (2022) and Wealthy (2018), who emphasize that without a foundation of perceived legitimacy and shared organizational values, top-down regulations will inevitably fail to produce a genuine safety culture.

Consequently, the discussion points toward a necessary paradigm shift. While traditional approaches might suggest merely hiring more officers—a solution constrained by national budgets—this study argues, supported by the works of Mashdurohatun & Yasir (2022) and Suwandi (2023), that Timor-Leste must pursue technological leapfrogging. The implementation of Electronic Traffic Law Enforcement (ETLE) is not just a technological upgrade; it is a strategic imperative to bypass human resource limitations and restore the consistency of enforcement, thereby rebuilding public trust in the fairness of the legal system. Ultimately, as emphasized by the Global Road Safety Facility (Global Road Safety Facility, 2023) and the United Nations (United Nations Timor-Leste, 2024), transforming Dili's traffic landscape requires a holistic co-production of safety, where data-driven governance, technological innovation, and community-based civic education work in tandem to uphold the mandates of Decreto-Lei n.º 6/2003.

4. CONCLUSION

This study demonstrates that the effectiveness of motor vehicle regulation based on the Highway Code (Decreto-Lei n.º 6/2003) in the City of Dili is significantly constrained. Despite the commitment of the Traffic Police, the severe imbalance of having only 78 personnel to manage dense urban traffic, coupled with inadequate physical infrastructure (e.g., malfunctioning traffic lights, absent CCTV) and a low public safety culture, hinders optimal law enforcement and road safety. To address these challenges, strategic interventions are required on two fronts. Institutionally, the National Police of Timor-Leste (PNTL) must prioritize the strategic reallocation and addition of traffic personnel to critical hotspots. Concurrently, the government should accelerate the adoption of Electronic Traffic Law Enforcement (ETLE) systems to overcome manual enforcement limitations and ensure objective compliance monitoring. Societally, comprehensive formal and non-formal civic education is essential to instill traffic ethics, shifting public perception from mere rule-following to a proactive road safety culture.

Limitations and Future Research. This study is limited by its qualitative, Dili-centric scope. Future research should employ mixed-methods approaches, incorporating quantitative accident data and spatial hotspot analysis. Additionally, further investigation into the legal and technical feasibility of implementing ETLE in Timor-Leste is highly recommended to support evidence-based policies aligned with the UN Sustainable Development Goal 3.6 (halving global road traffic deaths by 2030).

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Data and Legal Materials Availability

The legal materials and supporting data utilized in this study are available from the Corresponding Author upon reasonable request.

Statement on AI Usage

During the preparation of this manuscript, the authors utilized ChatGPT solely to assist with grammatical editing, improving readability, and organizing the writing structure. The authors have thoroughly reviewed,

verified, and edited all content, accepting full responsibility for the substance, legal analysis, conclusions, and juridical reasoning presented in this article.

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