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RESEARCH

Advancing Sustainable Mobility: Implementation of Electronic Traffic Law Enforcement (ETLE) for Traffic Compliance in Makassar City

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Abstract

The implementation of the Electronic Traffic Law Enforcement (ETLE) policy in Makassar City represents a strategic initiative to modernize traffic law enforcement while supporting sustainable urban mobility. By encouraging compliance, improving road safety, and promoting orderly transportation systems, ETLE contributes to the development of a more efficient and environmentally responsible urban future. However, its implementation still faces several challenges, including low public understanding, limited technological literacy, and coordination constraints among implementing agencies. This study aims to analyze the implementation of the ETLE policy in Makassar City within the framework of sustainable mobility by examining implementing organizations, target groups, and environmental factors. A qualitative method with a descriptive approach was employed. Data were collected through in-depth interviews, observation, and documentation, involving police officers from the South Sulawesi Regional Police Traffic Directorate (Gakkum Sub-Directorate and ETLE operators) and road users. Using Thomas B. Smith's policy implementation theory, the findings reveal that ETLE implementation has been supported by cross-agency collaboration, although coordination and technical issues persist. Public compliance has improved, indicating progress toward sustainable mobility behavior, but understanding of ETLE mechanisms remains uneven. Environmental factors, including social characteristics, technological literacy, and infrastructure limitations, significantly influence effectiveness. Strengthening coordination, digital inclusion, and public awareness is essential to optimize ETLE in achieving sustainable mobility.

Keywords Policy Implementation, ETLE, Traffic Law Enforcement, Makassar City, Sustainable Mobility.

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INTRODUCTION

Traffic is one of the most crucial aspects of urban life, directly influencing economic activity, transportation systems, and the social life of communities (Kadarisman et al., 2016). With the rapid growth in the number of motor vehicles, particularly in major cities, traffic management faces increasingly complex challenges. Issues such as congestion, traffic violations, and high accident rates have become major concerns requiring serious attention from governments, law enforcement agencies, and the public.

Compliance with traffic regulations reflects the level of legal awareness within society and significantly affects the effectiveness of urban transportation systems (Haryanto, 2018). However, traffic violations remain a persistent issue, especially in urban areas, not only disrupting public order but also increasing the risk of road accidents. This condition highlights the need for policy innovation and the utilisation of technology in traffic law enforcement.

One of the innovations developed is Electronic Traffic Law Enforcement (ETLE), a technology-based enforcement system that utilises surveillance cameras to automatically record traffic violations (Hariati & Triadi, 2024; Piantari et al., 2024). In the context of sustainable mobility, ETLE plays an important role in promoting safer, more efficient, and environmentally responsible transportation systems by encouraging traffic discipline, reducing congestion, and supporting orderly road use. From a regulatory perspective, the implementation of ETLE is governed by the Chief of the Indonesian National Police Regulation No. 1 of 2021 on Electronic Traffic Law Enforcement, which was later updated through the Indonesian National Police Regulation No. 2 of 2025 concerning the enforcement of traffic and road transport violations based on electronic evidence. This system is designed to enhance transparency, minimise the potential for misconduct by officers, and promote public legal awareness through objective, evidence-based enforcement, thereby contributing to the long-term development of sustainable and accountable urban transport governance.

The city of Makassar, as one of Indonesia's metropolitan cities, has become part of the national ETLE implementation. The high mobility of the population and the rapid growth of motor vehicles pose serious challenges for traffic management in the city. Since its introduction in 2021, ETLE in Makassar has been supported by the installation of surveillance cameras at several strategic locations and integration with the motor vehicle database managed by the Traffic Directorate of the South Sulawesi Regional Police (Hasibuan & SH, 2023). In its initial phase, a total of 2,002 traffic violations were successfully recorded by the ETLE system (Himawan, 2021).

The implementation of ETLE in Makassar has continued to evolve. In 2023, the number of traffic violations recorded by ETLE cameras reached 8,283 cases (KompasTvMakassar, 2023), while in 2024, there were 3,429 recorded violations (Rakyat Sulsel, 2024). These figures indicate that although ETLE has contributed to detecting traffic violations, the level of public compliance remains a challenge that requires further attention. Factors such as infrastructure readiness, technological reliability, and public digital literacy also influence the effectiveness of this policy implementation (Hasballah, 2024; Sholihin, 2023).

In the context of public administration, the implementation of the ETLE policy cannot be understood merely as a technical process, but rather as a complex social and institutional process. The policy implementation theory proposed by Thomas B. Smith emphasises that successful implementation is

influenced by the interaction between the ideal policy, implementing organisations, target groups, and environmental factors. Misalignment among these elements may lead to implementation failure, even when the policy has been well designed. Therefore, examining the implementation of ETLE is essential to understand the extent to which the policy operates as intended and the factors influencing its performance.

Based on this background, this study aims to analyse the implementation of the Electronic Traffic Law Enforcement (ETLE) policy in improving traffic compliance in Makassar City within the framework of sustainable mobility. This study is expected to provide a comprehensive overview of the effectiveness of the ETLE policy and the challenges encountered in practice, thereby serving as a basis for developing more adaptive, technology-driven, and sustainable traffic law enforcement policies that support safer, more efficient, and environmentally responsible urban transportation systems.

RESEARCH METHODS

This research was conducted over approximately two months in the city of Makassar, involving the Traffic Directorate (Ditlantas) of the South Sulawesi Regional Police as the implementing agency of the Electronic Traffic Law Enforcement (ETLE) policy. The selection of the research location was based on the consideration that Makassar is the first region in South Sulawesi Province to implement the ETLE policy as part of the national programme for electronic-based traffic law enforcement (Makassar Metro, 2021).

This study employs a descriptive research design with a qualitative approach. This approach was chosen as it aims to provide an in-depth description of the phenomenon of ETLE policy implementation in improving traffic compliance in Makassar through an understanding of the perceptions, experiences, and interactions of the actors directly involved. Qualitative research enables the researcher to examine phenomena in a more detailed and contextual manner in accordance with the characteristics of the problem being studied, without the intention of testing specific hypotheses, but rather describing conditions as they are (Creswell, 2002; Nasution, 2016).

The data sources in this study consist of primary and secondary data. Primary data were obtained directly from research informants through observation and interviews. Observations were conducted by directly examining the process of ETLE-based traffic law enforcement and the level of compliance among road users on several main roads in Makassar, such as Jalan A.P. Pettarani and Jalan Urip Sumoharjo. Meanwhile, interviews were conducted with police officers, particularly from the Law Enforcement Sub-Directorate (Subdit Gakkum) of the Traffic Directorate of the South Sulawesi Regional Police, ETLE operators, and members of the public as road users to obtain information regarding the implementation, challenges, and perceptions of the ETLE policy. Secondary data were obtained through literature review and analysis of official documents, such as ETLE ticketing data, the number of violations recorded by ETLE cameras, relevant laws and regulations, and organisational documents within the South Sulawesi Regional Police.

The selection of informants was carried out using a purposive sampling technique, in which informants were determined based on specific considerations relevant to the research objectives. Informants were selected because they were considered to have knowledge, experience, and direct involvement in the implementation of the ETLE policy, enabling them to provide accurate and in-depth information. The total number of informants in this study was 12, consisting of one officer from the Law

Enforcement Sub-Directorate of the Traffic Directorate of the South Sulawesi Regional Police, one ETLE operator, eight motorcycle riders, and two car drivers.

Data collection techniques were conducted through observation, interviews, and documentation, which complement one another. Observation was used to obtain an empirical overview of traffic conditions and the level of road user compliance; interviews were used to explore in-depth information and perspectives from informants; while documentation was used to support the data obtained from observations and interviews through policy documents, archives, and statistical data related to the implementation of ETLE in Makassar (Moleong, 2010).

Data analysis was carried out qualitatively through several stages, namely data reduction, data display, and conclusion drawing. These stages refer to the interactive data analysis model proposed by Matthew B. Miles and A. Michael Huberman, which emphasises a continuous and cyclical analytical process. Data reduction was conducted by selecting, simplifying, and focusing the data obtained from the field in accordance with the research focus. Subsequently, the reduced data were presented in the form of descriptive narratives to facilitate understanding of patterns and relationships among the observed phenomena. The final stage of analysis involved drawing conclusions, which is the process of interpreting the meaning of the data continuously to identify patterns, themes, and relationships relevant to the implementation of the ETLE policy, as well as verifying the conclusions based on field data (Eva, 2020; Rukajat, 2018).

RESULTS AND DISCUSSION

The implementation of the Electronic Traffic Law Enforcement (ETLE) policy in the city of Makassar, when viewed from the indicator of ideal policy, shows that this policy has a clear objective, namely to create traffic order through a technology-based law enforcement system. However, in practice, this objective has not been fully understood by all stakeholders. Many members of the public still perceive ETLE merely as a tool for penalising violations rather than as a means of fostering traffic discipline. This condition indicates that the substance of the policy has not been effectively communicated, thereby requiring enhanced public socialisation and education so that the meaning and benefits of the policy can be comprehensively understood.

Based on the implementing organisation indicator, the findings reveal that coordination among implementing agencies, such as the Traffic Directorate of the South Sulawesi Regional Police, the Department of Transportation, and the Regional Revenue Agency (Bapenda), has not been optimal. In fact, the collaboration that was initially established is no longer as active as it was during the early stages of ETLE implementation. The lack of communication, coordination, and clear division of responsibilities has hindered policy implementation, particularly in the enforcement process and the maintenance of ETLE infrastructure. In addition, the limited number of surveillance cameras and uneven technical support across several locations further weaken the effectiveness of policy implementation.

From the perspective of the target group and environmental factors, it can be observed that the public is still in the process of adapting to the ETLE system. Most road users do not yet fully understand how the system operates, particularly regarding enforcement procedures and the sanctions imposed. Meanwhile, environmental factors such as low legal awareness, habitual traffic behaviour, and limited support from local government also influence the effectiveness of this policy. Therefore,

strengthening inter-agency collaboration, improving public communication, and fostering legal awareness within the community are essential steps towards achieving effective and sustainable ETLE implementation in the city of Makassar.

The discussion of the research findings based on the policy implementation indicators proposed by Thomas B. Smith is as follows:

1) **Ideal Policy**

The concept of an ideal policy according to Thomas B. Smith (1973) describes how public policy should be designed and implemented in order to achieve its intended objectives. In his view, an ideal policy must have clear objectives, realistic implementation strategies, and support from institutional structures capable of delivering the policy to the operational level. An ideal policy also requires alignment between policy formulation and the social, political, and administrative conditions in the field. Thus, an ideal policy is not merely normative but must also be operational and practically interpretable by implementing actors and target groups.

Smith further emphasises that an ideal policy can function effectively when supported by strong coordination among implementing organisations, clear communication between policymakers and implementers, and support from the social environment. When any of these elements fails to function, a policy that appears ideal on paper becomes difficult to implement in practice. This perspective aligns with Dunn (2015), who argues that the effectiveness of policy implementation depends largely on how well policy design considers context, implementing actors, and the dynamics of beneficiary communities.

Based on the findings, the implementation of ETLE in Makassar has demonstrated a clear policy direction and a strong legal foundation through Law No. 22 of 2009 on Road Traffic and Transportation and the Indonesian National Police Regulation No. 2 of 2025 on Electronic Traffic Law Enforcement. This policy represents a form of digital transformation in law enforcement aimed at enhancing transparency, accountability, and efficiency in public service delivery. Implementing officers perceive this policy as an effort to modernise the conventional manual ticketing system into an electronic one. However, field findings indicate that public understanding remains varied—some individuals have gained awareness through social media and television, while others lack detailed knowledge of the rules and procedures. This suggests that although the ETLE policy is normatively ideal, it still requires strengthening in terms of public dissemination and education.

These findings are consistent with Mukhtari et al. (2023), who found that the effectiveness of ETLE implementation in Makassar is constrained by limited public understanding and inadequate technological infrastructure, such as the number of cameras and data integration systems. Similarly, Hartina (2019) reported that public perceptions of electronic ticketing in Makassar vary, with some viewing it as effective and transparent, while others feel excluded due to limited socialisation. These findings reinforce the conclusion that although ETLE has a clear legal basis and direction, it has not been fully accepted and understood by all segments of society.

This perspective is in line with Thomas B. Smith (1973), who explains that policy implementation depends not only on the clarity of policy formulation but also on the capacity of implementing organisations and communication among actors within the policy system. In other words, a policy that is ideal at the regulatory level may still face challenges during implementation if inter-agency

coordination is weak or if policy communication fails to reach all relevant stakeholders. In the context of ETLE, this is reflected in the limited cross-sector collaboration among the Police, the Department of Transportation, and local government in supporting infrastructure optimisation and public education regarding electronic law enforcement systems.

This is further supported by Matland (1995), who argues that policy implementation success is influenced by two key variables: ambiguity and conflict. In the context of ETLE in Makassar, although the policy has a clear legal basis and direction, ambiguity persists at the public level, particularly regarding reporting mechanisms and electronic fine procedures. Additionally, potential conflict arises from weak coordination among implementing agencies, which may hinder policy effectiveness.

Furthermore, Kurhayadi (2023) emphasises that an ideal public policy must not only be legally established but also supported by effective communication, adequate resources, and a supportive bureaucratic structure. In the context of ETLE, this is relevant to the situation in Makassar, where technical limitations such as the number of active surveillance cameras and suboptimal data integration systems remain challenges. Therefore, the ideality of the ETLE policy can only be achieved when it is supported by technical readiness, human resources, and a bureaucracy that is adaptive to digital technological developments.

This is consistent with Samsiah et al. (2024), who found that ETLE implementation has positively contributed to increased legal certainty and reduced traffic violations, although public awareness remains a major challenge. Similarly, Narullita (2024) found that ETLE in East Java effectively improves legal awareness, but its long-term impact depends on consistent public education. Thus, although the ETLE policy has been ideally formulated in terms of regulation and objectives, its effectiveness ultimately depends on implementation support, inter-agency synergy, and active public engagement in understanding and complying with the policy.

Overall, the ideal policy indicator in the implementation of ETLE in Makassar shows that the policy has a clear direction, a strong legal foundation, and objectives aligned with the principles of transparency and accountability in law enforcement. However, this ideality has not been fully achieved due to gaps between policy design and implementation in practice, particularly in terms of public socialisation, public understanding, and inter-agency coordination.

2) **Implementing Organisation**

In the policy implementation model proposed by Thomas B. Smith (1973), the implementing organisation plays a crucial role in bridging the gap between ideal policy and its practical execution. Smith emphasises that implementation effectiveness is determined by the organisation's ability to understand policy objectives, allocate resources, and coordinate with other involved actors. Implementing organisations are not merely executors of instructions but also function as intermediaries between policymakers and target groups. If bureaucratic structures are inefficient or inter-unit communication is weak, policy implementation may deviate from its original design.

Similarly, Donald S. Van Meter and Carl E. Van Horn (1975) assert that the performance of implementing organisations is influenced by three main aspects: bureaucratic structure, human resources, and commitment to policy objectives. Effective organisations typically possess clear coordination mechanisms and strong internal communication systems, enabling consistent policy translation at the operational level. In the context of digital public policy, including ETLE systems,

implementing organisations are required to be adaptive to technological innovations and capable of establishing cross-institutional data integration. This is essential to ensure uniform policy implementation across regions and to avoid discrepancies arising from varying institutional interpretations.

Based on the research findings, the implementation of ETLE in Makassar indicates uneven coordination among supporting agencies, particularly due to the diminished collaboration between the Traffic Directorate of the South Sulawesi Regional Police and the Regional Revenue Agency (Bapenda). As a result, processes such as sending violation confirmation letters, handling fine payments, and blocking vehicle registration certificates for non-compliant offenders have become less effective. Although the organisational structure reflects Smith's (1973) framework of reciprocal relationships among actors, weak coordination between institutions remains a significant challenge. This suggests that the integration of law enforcement and digital public service functions in ETLE implementation still requires strengthening.

These findings are consistent with Praharsa et al. (2024), who argue that the effectiveness of ETLE policies depends heavily on institutional capacity and inter-agency synergy, particularly among the police, local government, and judicial institutions. Although coordination exists, challenges remain in infrastructure maintenance and technical limitations. The reduction in operational ETLE camera points from 16 to 9 due to equipment damage indicates instability in organisational performance. Similar findings were reported by Pardede (2022) in the Banten Regional Police, where ETLE implementation faced challenges due to reliance on central vendors and limited maintenance capacity, resulting in delays in equipment repair.

Furthermore, Anom et al. (2025) highlight that ETLE, as part of a cyber-physical system, requires implementing organisations to possess adequate digital literacy and technical capabilities. In Makassar, although Traffic Directorate personnel have received training and certification, further enhancement of technical competencies is necessary to sustain system performance. This aligns with Thomas B. Smith (1973), who emphasises that successful implementation depends not only on organisational structure but also on the adaptive capacity of implementers in response to policy environment dynamics.

Overall, the findings indicate that the ETLE implementing organisation in Makassar has fulfilled several aspects of Smith's implementation model, particularly in terms of role distribution and inter-agency coordination. However, challenges remain in equipment maintenance and coordination stability, which require further strengthening to achieve optimal policy implementation. These findings are supported by Putri (2024), who identifies weak consistency in infrastructure supervision and limited technical support as key challenges in regional ETLE implementation. Therefore, follow-up policies such as technical decentralisation and enhanced institutional support are necessary to ensure that implementing organisations have sufficient autonomy and capacity to maintain ETLE infrastructure effectively.

3) **Target Group**

In the theory of public policy implementation proposed by Thomas B. Smith (1973), the target group is one of the key components determining the success or failure of a policy. The target group refers to those who directly receive the benefits, impacts, or consequences of the implemented policy. Smith

emphasises that implementation will not be effective if the target group does not understand the substance of the policy or lacks the motivation to comply with established rules. Therefore, communication and dissemination of policy information to the target group must be carried out continuously so that the policy can be socially accepted and implemented with full awareness, rather than merely due to legal coercion.

Furthermore, the understanding and participation of the target group are influenced by social, economic, and cultural factors embedded within society. According to Paul A. Sabatier and Daniel A. Mazmanian (1980), the effectiveness of policy implementation largely depends on the ability of the target group to adjust their behaviour in line with the policy direction. When policies are implemented within target groups characterised by low educational levels, limited policy literacy, or weak trust in government, resistance and low public engagement become major challenges. Thus, participatory and adaptive approaches are essential to ensure that target groups are not merely passive recipients but active partners in successful implementation.

Based on the research findings, the target group of the ETLE policy in Makassar demonstrates varied responses to its implementation. Most urban residents have understood the function of ETLE as a digital traffic monitoring system aimed at improving order and reducing violations. They perceive the system as more transparent and fair, as it eliminates direct interaction between offenders and law enforcement officers. This finding aligns with Thomas B. Smith (1973), who states that policy success depends on the acceptance and awareness of the target group. When the target group perceives the policy as fair and clearly defined, they are more likely to comply voluntarily without direct enforcement pressure.

However, interview results also indicate that some members of the public still do not fully understand the ETLE mechanism, including the process of violation confirmation and the procedures for paying fines online. This reflects a gap in understanding between individuals with better access to information and those with limited digital literacy. This finding is consistent with Sukma et al. (2025), who identified limited digital literacy and insufficient public outreach as major challenges in ETLE implementation in Makassar. Similarly, Sijabat et al. (2024) emphasise that public perception of ETLE is strongly influenced by technological understanding and the clarity of information provided by authorities.

Another study by Narullita (2024) in East Java highlights that changes in driving behaviour following ETLE implementation indicate improved legal awareness, although this improvement is not evenly distributed due to varying levels of legal understanding among road users. This supports the findings in Makassar, suggesting that while ETLE has contributed to increased surveillance and reduced violations, its sustainability depends heavily on effective public communication. Within Smith's (1973) framework, this reflects a gap in the reciprocal relationship between implementers and the target group, where communication strategies have not fully adapted to diverse societal characteristics.

Overall, the findings indicate that the success of ETLE in Makassar is not solely due to its advanced electronic system but also to the growing collective awareness of traffic discipline among some members of society. However, to achieve comprehensive effectiveness, more inclusive socialisation strategies are required, involving local media, road user communities, and educational institutions to ensure that all segments of society understand and accept the policy.

4) **Environmental Factors**

In public policy implementation theory, Thomas B. Smith (1973) explains that environmental factors have a significant influence on policy success. The environment includes the social, economic, political, and cultural context in which a policy is implemented. These factors determine how policies are received, interpreted, and executed by both implementers and target groups. A supportive environment characterised by political stability and public trust facilitates effective implementation, whereas social resistance, conflicting interests, or resource limitations may hinder policy success. Thus, the policy environment is not merely a backdrop but a dynamic element influencing every stage of implementation.

Daniel A. Mazmanian and Paul A. Sabatier (1983) further emphasise that successful implementation depends on the extent to which external conditions support policy objectives. They identify three key dimensions of the policy environment: socio-economic conditions, political support from key actors, and the administrative capacity of implementing institutions. These aspects often differentiate successful policies from unsuccessful ones. For instance, rigid bureaucratic environments, lack of transparency, or limited technological capacity can pose significant barriers. Therefore, analysing environmental factors is essential for understanding real-world conditions and adapting implementation strategies accordingly.

Based on the research findings, environmental factors significantly influence the effectiveness of ETLE implementation in Makassar. Support from local government and stakeholders including the South Sulawesi Provincial Government, the Department of Transportation, the Regional Revenue Agency (Bapenda), and the Police plays a crucial role in sustaining the programme. Thomas B. Smith (1973) highlights that a conducive policy environment strengthens coordination and facilitates implementation. This is reflected in the commitment of local authorities to support ETLE operations through infrastructure maintenance and inter-agency coordination. However, challenges such as budget limitations, differences between ETLE and CCTV systems, and reliance on central vendors remain obstacles that need to be addressed.

In addition to institutional factors, the social environment also plays a significant role. The people of Makassar have gradually begun to show positive behavioural changes, with increased awareness of traffic discipline due to ETLE surveillance. However, some individuals still lack a full understanding of digital ticketing mechanisms. This aligns with Grindle (2017), who argues that social support and public acceptance are critical to successful policy implementation. Zhang (2024) further reinforces this by describing the policy environment as an interactive system comprising technological readiness, public participation, and local government support. In Makassar, these elements still need to be balanced to ensure optimal policy performance.

From a technological and infrastructural perspective, the study finds that unstable internet networks and damaged ETLE cameras present technical barriers to effective implementation. According to Permana (2024), such challenges reflect disparities in digital infrastructure readiness across regions in Indonesia, which can affect the success of electronic-based public policies. Meanwhile, Sutrisno and Silitonga (2023) emphasise the importance of a participatory social environment in strengthening policy implementation. This is particularly relevant in Makassar, where collaboration between the public and government is essential for improving technological literacy and building trust in digital law enforcement systems.

Thus, the success of ETLE in Makassar largely depends on the ability of the government and related institutions to adapt to the dynamic social, technological, and political environment.

Table 1. ETLE Location Points in Makassar City, 2025

No.	ETLE Location Points
1	[South Sulawesi Regional Police] Jl. Urip Sumoharjo (in front of Governor's Office)
2	[South Sulawesi Regional Police] Jl. A.P. Pettarani (in front of Ministry of Religious Affairs Office)
3	[South Sulawesi Regional Police] Jl. A.P. Pettarani (in front of Living Plaza)
4	[South Sulawesi Regional Police] Jl. Perintis Kemerdekaan (in front of IMIM Islamic Boarding School)
5	[South Sulawesi Regional Police] Jl. A.P. Pettarani (in front of The Mutiara)
6	[South Sulawesi Regional Police] Jl. Urip Sumoharjo (in front of Aspol Panaikang)
7	[South Sulawesi Regional Police] Jl. Veteran Selatan (in front of Pegadaian)
8	[South Sulawesi Regional Police] Jl. Perintis Kemerdekaan (in front of RM Ali Murah)
9	[South Sulawesi Regional Police] Jl. A.P. Pettarani (in front of Pos Makassar)
Total	9 Locations

Source: Traffic Directorate of the South Sulawesi Regional Police, 2026.

Therefore, the environmental conditions in Makassar reflect a combination of strong support and significant challenges in the implementation of ETLE. From an institutional perspective, the local government and stakeholders such as the Department of Transportation, the Regional Revenue Agency (Bapenda), and the Police have demonstrated relatively good coordination, including in equipment maintenance and operational supervision, indicating a fairly conducive political and bureaucratic environment. However, technological and infrastructural aspects remain major constraints, including unstable internet networks and damaged surveillance cameras. From a social perspective, the community has begun to exhibit more disciplined traffic behaviour due to ETLE monitoring; however, digital literacy and understanding of electronic ticketing mechanisms are still uneven. Therefore, the success of ETLE implementation in Makassar largely depends on inter-agency synergy, the improvement of digital infrastructure, and continuous public outreach to ensure that policy effectiveness can be achieved optimally and sustainably.

In the context of sustainable mobility, ETLE represents a crucial policy instrument in fostering safer, more efficient, and environmentally sustainable urban transportation systems. By encouraging compliance with traffic regulations, ETLE contributes to reducing traffic violations, minimizing congestion, and lowering vehicle emissions caused by inefficient road behavior. Furthermore, the integration of digital enforcement systems supports the transition toward smart and sustainable cities, where technology is utilized to optimize mobility management and enhance public accountability. However, achieving these sustainability outcomes requires not only technological readiness but also inclusive access, improved digital literacy, and continuous public engagement to ensure that all segments of society can participate effectively in and benefit from the system.

CONCLUSION

The implementation of the Electronic Traffic Law Enforcement (ETLE) policy in Makassar City represents a strategic effort to modernize traffic law enforcement through digital transformation,

shifting from conventional to electronic systems. This policy is not only aimed at enhancing transparency, accountability, and efficiency in law enforcement but also contributes to the broader agenda of sustainable mobility by encouraging traffic discipline, reducing congestion, and supporting safer and more environmentally responsible urban transportation systems. The study finds that ETLE in Makassar is supported by a clear legal framework and has begun to influence positive behavioural changes, as reflected in improved traffic discipline among road users. However, public understanding of ETLE mechanisms remains uneven, indicating the need for more inclusive and continuous socialisation. From an institutional perspective, inter-agency coordination has not yet been fully optimal, particularly due to weakened collaboration between the Traffic Directorate of the South Sulawesi Regional Police and the Regional Revenue Agency (Bapenda), which affects key processes such as violation confirmation and data integration. Additionally, technical constraints, including limited infrastructure and varying levels of digital literacy among both officers and the public, hinder the effectiveness of implementation. These challenges directly impact the potential of ETLE to fully support sustainable mobility outcomes.

This study is limited by its qualitative approach, which focuses on in-depth insights within a specific local context and may not fully capture broader comparative dynamics across regions. In addition, limited access to quantitative performance data on traffic reduction, emission levels, or long-term behavioural change restricts the ability to measure the direct contribution of ETLE to sustainable mobility outcomes.Future studies are recommended to adopt mixed-method approaches by integrating quantitative data, such as traffic flow efficiency, accident rates, and emission reductions, to better assess the impact of ETLE on sustainable mobility. Comparative studies across cities or regions are also needed to identify best practices in digital traffic enforcement. Furthermore, future research should explore the integration of ETLE within broader smart city and sustainable governance frameworks, particularly in strengthening digital inclusion, institutional collaboration, and adaptive policy design to ensure long-term sustainability in urban mobility systems.

DECLARATION OF COMPETING INTEREST

The author declares that there are no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the preparation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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