

# EVALUATING EFFECTIVENESS OF ETLE AND DESIGNING ATCS INTEGRATION FOR TRAFFIC VIOLATION REDUCTION IN MAGELANG REGENCY

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## Article Info

### *Article history:*

Received July 3, 2025  
Revised October 23, 2025  
Accepted January 7, 2026

### *Keywords:*

ETLE  
ATCS  
Transportation  
ITS

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## ABSTRACT

Transportation as a means of public mobility in Indonesia continues to face high traffic accident rates, primarily due to violations such as speeding and red-light running. Electronic Traffic Law Enforcement (ETLE) has emerged as a technology-based law enforcement solution, but its effectiveness remains limited due to the narrow coverage of static systems. This study aims to analyze the effectiveness of ETLE and design its integration with the Area Traffic Control System (ATCS) to enhance traffic violation monitoring in Magelang Regency. The research method is census approach by collecting primary violation data from static and mobile ETLE units during March 2024–2025. Analysis results indicate a decline in violations from 17,495 cases (2020) to 4,739 cases (2023), yet the limited deployment of static ETLE at only one strategic point hinders optimal detection. Integration of ETLE-ATCS across 19 traffic light (APILL) points is proposed to expand coverage through real-time detection, automated verification, and traffic signal adjustments based on real-time data. Simulations of this integrated system demonstrate the potential for more transparent and efficient law enforcement, alongside reduced accident risks. Consequently, the proposed system integration is expected to foster safer, more orderly, and sustainable transportation in Magelang Regency.

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## 1. INTRODUCTION

Transportation serves as a means of public mobility and reflects a nation's character and progress. As a reflection of a nation's culture, road safety stands as the fundamental principle in transportation management [1]. Accidents have become the primary transportation problem in Indonesia. Traffic accidents have evolved into an increasingly concerning complex issue, as evidenced by the consistent upward trend in annual case numbers [2]. The latest data released by the Indonesian National Police Traffic Corps (Korlantas Polri) in 2024



also serves as a solution to overcome the limitations of manual enforcement, particularly in high-traffic density areas or geographically challenging locations. Furthermore, ETLE is designed to create a deterrent effect through objective, transparent, and consistent law enforcement, thereby promoting sustainable behavioral change among drivers.

Data collection for this study employed a comprehensive census approach without sampling, encompassing all violation records from both static and mobile Electronic Traffic Law Enforcement (ETLE) systems in Magelang Regency during March 2024 (mobile) and March 2025 (static). Primary data included all violations captured by static ETLE cameras (installed at strategic intersections, school zones, and tourist areas) and mobile ETLE units operating throughout Magelang Regency.

### 3. RESULTS AND DISCUSSION

#### 3.1 Number of vehicles recorded in Magelang Regency Police (POLRES Magelang) 2024.

**Table 1** Vehicle Statistics of Magelang Regency

Vehicle Classification	Year	Static
Motor Cycle	2019	437.411
	2020	454.980
	2021	472.549
Passanger Vehicle	2019	39.232
	2020	43.327
	2021	47.422
Bus	2019	1.004
	2020	1.010
	2021	1.043
Truck	2019	16.338
	2020	17.643
	2021	18.948

According to 2024 data from the Magelang Regency Police (Polres Magelang), vehicle numbers in the region showed consistent growth from 2019 to 2021. Motorcycles dominated with significant increases, rising from 437,411 units in 2019 to 454,980 units in 2020, and reaching 472,549 units in 2021. Passenger cars also demonstrated steady growth, climbing from 39,232 units (2019) to 43,327 units (2020), and 47,422 units (2021). Meanwhile, trucks increased from 16,338 units (2019) to 17,643 units (2020), and 18,948 units (2021), while buses recorded the lowest growth from 1,004 units (2019) to 1,010 units (2020), and 1,043 units (2021). This data reveals growth trends across all vehicle categories, with motorcycles remaining the dominant transportation mode in Magelang Regency. These patterns indicate the persistent predominance of private vehicle usage, which facilitates high mobility but simultaneously elevates traffic accident risks partly attributable to violations and non-compliance among motor vehicle drivers.

**Table 2** Existing condition of ETLE in Magelang Regency

Description	Year			
	2020	2021	2022	2023
Traffic Violations	17.495	9.410	7.976	4.739
Warnings	9.608	4.261	4.310	4.478
Fines	1.028.746.000	306.309.000	486.443.000	436.856.000



**Figure 2** Graph Traffic Violation in Magelang Regency

The graph above illustrates the number of traffic violators recorded by the Magelang Regency Police (Polres Magelang). During the 2020-2023 period, Magelang Regency exhibited a significant downward trend in traffic violations, decreasing from 17,495 cases in 2020 to nearly half that number (9,410) in 2021, then continuing to decline to 7,976 in 2022 and 4,739 in 2023. Similarly, warnings showed a sharp reduction from 9,608 in 2020 to 4,261 in 2021, but subsequently stabilized with slight increases to 4,310 in 2022 and 4,478 in 2023. Fine revenue peaked in 2020 at Rp 1.028 billion, plummeted to Rp 306 million in 2021 following the decrease in violations, then rose to Rp 486 million in 2022 before declining again to Rp 436 million in 2023. This fluctuation reflects both changes in average fines per violator and evolving enforcement policies during and after the pandemic period.



**Figure 3** Static ETLE in Magelang Regency

The static ETLE in Magelang city is located on Jalan Magelang-Purworejo Glagah, Banjarnegoro, Mertoyudan District, Magelang Regency, Central Java. The ETLE condition remains good as this static ETLE is new, assisting the duties of the mobile ETLE previously used by the Police (POLRES) to enforce ticketing sanctions against road users violating regulations. The process of handling traffic violations through electronic devices is formally regulated in Undang-undang No. 22 Pasal 272 Lalu Lintas dan Anguktan Jalan about the Traffic Law. This article states that electronic devices can be utilized as supporting tools in law enforcement efforts related to traffic and road transportation violations. Furthermore, recordings from these devices hold legal force as valid evidence in court proceedings. In field conditions, the Static ETLE in Magelang Regency has enforced actions against road users. The implementation of ETLE in Magelang Regency has recorded ETLE violators in the system.

**Table 3** Traffic Violations Capturing by Static ETLE

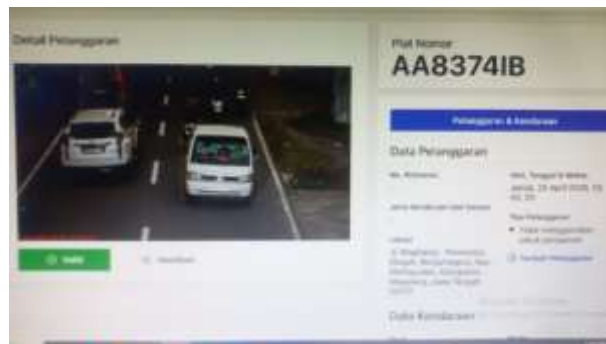
Year	Month	Violations
2024	Maret	1853
2025	Maret	1688

The data indicates that violators recorded by the ETLE system totaled 1,853 in March 2024 and 1,688 in March 2025, demonstrating that ETLE in Magelang Regency has not yet maximized traffic law enforcement. This limitation occurs because the system is installed at only one road section and cannot accommodate most roads across the regency.

The procedure for settling traffic violations recorded via Electronic Traffic Law Enforcement (ETLE) begins with data verification on the Vehicle Registration Certificate (STNK). If the vehicle owner's and violator's data match, the violator can scan the barcode through the designated website. Subsequently, the violator must fill in identity details according to the driver's National ID Card (KTP). After data confirmation, the violator waits 24 hours to receive an SMS notification containing the form code, BRIVA code (Bank Indonesia Virtual Account), and court hearing schedule.

Fine payment can be made online via transfer to BRIVA or offline by visiting designated offices. If the STNK shows no blockage after payment, the case is considered resolved. However, if the violator attends the hearing at the Prosecutor's Office, any unused fine balance (e.g., maximum fine Rp250,000 reduced to Rp100,000 in court) will be refunded. Violators may also retrieve previously confiscated evidence after the hearing process.

These sanctions aim to create a deterrent effect and educational action so violators recognize their mistakes and avoid repeating violations in the future. Through this mechanism, it is expected that public legal awareness will increase and compliance with traffic regulations can be sustainably achieved.



**Figure 4** Result of ETLE Captured

The captured results from the Electronic Traffic Law Enforcement (ETLE) system show electronically recorded traffic violations. The data includes:

1. Vehicle Identification (Number plate and vehicle type).
2. Violation detail:
  - a. Violation type (ex. Speeding, red light running, not wearing helmet, and others).
  - b. Time, date, year, and location coordinat violation.

Visual Documentation: Photos or video recordings serving as evidence of violations

After the ETLE camera system captures a traffic violation, officers verify the data before uploading it to the database. This is followed by the issuance of a traffic ticket and the corresponding fine. Failure to settle the fine will result in the vehicle's registration number being blocked by the Traffic Police Unit (Satlantas)

The ETLE system significantly assists police in traffic law enforcement. However, its implementation faces challenges: static ETLE units can only monitor roads with installed cameras, covering a small fraction of

Magelang Regency's road network. Additionally, road users covering license plates commit illegal acts (Pasal 287 UU LLAJ) that endanger public safety. ETLE exists to regulate traffic, not entrap violators. By obscuring plates, individuals undermine a system designed to protect all road users.



Figure 5 Reporting of ETLE PRESISI App

Regarding Road Users Who Forge Others' License Plates: 'Borrowing another person's plate during violations constitutes high-risk identity fraud. If caught, penalties include not only fines but also criminal prosecution under Article 263 of the Criminal Code (KUHP). Beyond harming the legitimate plate owner, this action undermines trust in the legal system. Note: ETLE systems employ advanced technology capable of detecting fraud through vehicle movement patterns and driver facial recognition.

### 3.2 Integration ETLE with ATCS

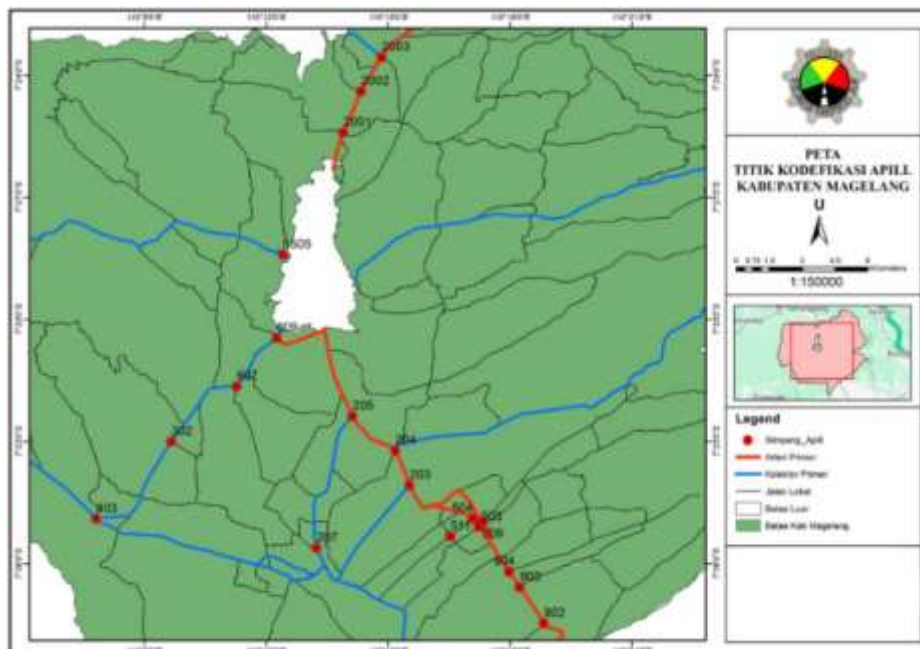
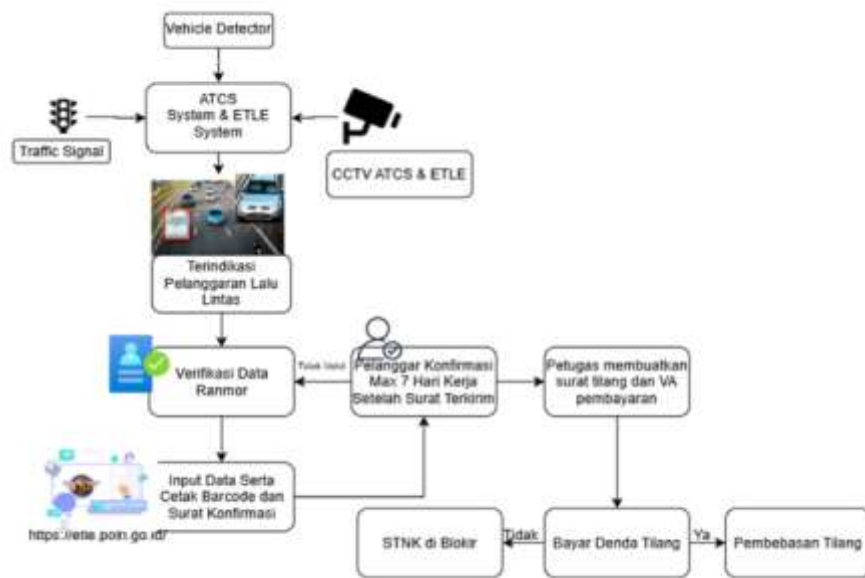


Figure 6 Traffic Light Map Magelang Regency

To maximize traffic law enforcement programs for accident prevention, Magelang Regency requires an integrated system with comprehensive road coverage. While ETL is crucial, its implementation still faces coverage limitations. With Magelang's expansive terrain where districts and villages interconnect through road networks installing ETL at every traffic-light intersection integrated with ATCS (Area Traffic Control System) would dramatically expand enforcement reach. This strategic integration is visually demonstrable through Magelang's Traffic Light Map (Peta APILL), which identifies optimal installation points across 21 districts.

Magelang Regency has approximately 19 traffic light (APILL) points distributed across its territory. System integration is essential to expand coverage and enhance ETL effectiveness in supporting safer transportation. The following diagram illustrates the integrated ETL-ATCS system designed to maximize enforcement efficiency in Magelang Regency.



**Figure 7** The diagram details integration ETL and ATCS

The diagram details the integrated workflow of ETL (Electronic Traffic Law Enforcement) and ATCS (Area Traffic Control System) for electronic traffic law enforcement, beginning with violation detection by vehicle detectors and traffic signals synchronized with ATCS & ETL CCTV systems that record violating vehicles. Following detection, violation data undergoes verification against motor vehicle registry records, and if validated, the system automatically generates a confirmation letter with barcode through <https://etle.polri.go.id>, which is mailed to the vehicle owner's registered address with a mandatory seven-business-day response window upon receipt. Should violators acknowledge the offense, officers issue a traffic citation and virtual payment account; failure to pay or respond triggers STNK (vehicle registration certificate) blocking, while successful payment resolves the case without further penalties collectively establishing a transparent, efficient, and technology driven enforcement ecosystem.

The comprehensive integration of ETL with ATCS would significantly enhance traffic law enforcement effectiveness and coverage. This synergy enables ETL deployment beyond isolated road segments, extending to all intersections equipped with CCTV or traffic signals (APILL). Consequently, traffic violations occurring across multiple junctions can be automatically detected and penalized without physical officer presence. This expansion of monitoring scope will substantially improve road regulation compliance while establishing more orderly, efficient, and sustainable traffic systems throughout urban areas.

#### 4. CONCLUSION

Based on the analysis of vehicle and traffic violation data in Magelang Regency, there is a trend of increasing private vehicle ownership, particularly motorcycles, rising from 437,411 units in 2019 to 472,549 units in 2021. This reflects high mobility levels and growing potential for traffic accident risks. Meanwhile, traffic violations recorded through the static ETL system show a decrease in violators from 17,495 cases in 2020 to 4,739 cases in 2023, accompanied by fluctuating fine amounts that reflect adaptive law enforcement policies during the pandemic and post-pandemic period. On the other hand, the coverage limitation of the static

ETLE system installed at only one location demonstrates suboptimal violation detection across the vast and evenly distributed road network throughout Magelang Regency.

To address these limitations, innovation is required through system integration between ETLE (both static and mobile) and ATCS (Area Traffic Control System) at all intersections equipped with traffic lights (APILL) and CCTV. With a real-time violation detection mechanism by vehicle detectors and traffic signals directly connected to the ETLE-ATCS system, violation data can be immediately verified, traffic tickets automatically issued, and the law enforcement process conducted more efficiently and transparently. Implementing this integration is expected not only to expand surveillance coverage and improve road user compliance, but also to support the creation of safer, more orderly, and efficient transportation systems across various urban areas of Magelang Regency.

#### ACKNOWLEDGEMENTS

We extend our sincere gratitude to Polres Kabupaten Magelang for your invaluable assistance in providing comprehensive data about ETLE. This support not only enhanced the accuracy of our outcomes but also exemplifies your dedication to evidence based public service in Magelang Regency. We deeply appreciate your professionalism and stand ready for future cooperative initiatives.

#### REFERENCES

- [1] K. D. Ruci, S. Soehodho, and R. J. Sumabrata, "Study of Factors Influencing Traffic Violations in Jakarta: Perspective of the Theory of Planned Behavior (TPB) in the Implementation of Electronic Traffic Law Enforcement (ETLE)," *Smart City*, vol. 4, no. 2, 2024, doi: 10.56940/sc.v4.i2.2.
- [2] N. Kandoli, H. Akbar, Sarman, and Darmin, "Faktor Yang Berhubungan Dengan Kecelakaan Lalu Lintas Pada Pengendara Sepeda Motor di Wilayah Polres Kotamobagu," *Graha Medika Public Health Journal*, vol. 2, no. 1, pp. 2829–1956, 2023, [Online]. Available: <https://journal.iktgm.ac.id/index.php/publichealth>
- [3] Tempo.co, "Korlantas Rilis Data Kecelakaan Lalu Lintas 2024: Naik Nyaris 8 Kali Lipat, Korban Jiwa 27 Ribu." [Online]. Available: <https://www.tempo.co/hukum/korlantas-rilis-data-kecelakaan-lalu-lintas-2024-naik-nyaris-8-kali-lipat-korban-jiwa-27-ribu-1181721>
- [4] F. A. Abdullah and F. Windiyastuti, "Electronic Traffic Law Enforcement (ETLE) sebagai Digitalisasi Proses Tilang," *Jurnal Kewarganegaraan*, vol. 6, no. 2, pp. 3004–3008, 2022.
- [5] A. A. Putri, "Efektivitas Penerapan Electronic Traffic Law Enforcement (ETLE) Mobile Dalam Pendidikan Pelanggaran Lalu Lintas di Wilayah Hukum Polda Jatim," *Surabaya*, May 2023.
- [6] R. Wardana, I. A. I. Mahbi, and N. A. Fuzain, "Implementasi Penegakan Hukum Berbasis Teknologi Informasi Terhadap Penggunaan Electronic Traffic Law Enforcement Bagi Pelanggar Lalu Lintas Oleh Lembaga Kepolisian (Implementation Of Information Technology-Based Law Enforcement Using Electronic Traffic L)," vol. 4, no. 8, pp. 1–15, 2024.
- [7] R. Wardana, I. Aryseptia Imam Mahbi, N. Annisa Fuzain, and M. Malik Ibrahim, "Implementasi Penegakan Hukum Berbasis Teknologi Informasi Terhadap Penggunaan Electronic Traffic Law Enforcement Bagi Pelanggar Lalu Lintas Oleh Lembaga Kepolisian," *Bulan Kedelapan*, Aug. 2024. [Online]. Available: <https://jhlg.rewangrencang.com/>
- [8] K. P. R. Indonesia, "Tekan Angka Kecelakaan Lalu Lintas, Kemenhub Ajak Masyarakat Beralih ke Transportasi Umum dan Utamakan Keselamatan Berkendara." [Online]. Available: <https://dephub.go.id/post/read/tekan-angka-kecelakaan-lalu-lintas-kemenhub-ajak-masyarakat-beralih-ke-transportasi-umum-dan-utamakan-keselamatan-berkendara>
- [9] Louis Bisma Wicaksana Praharsa, Muh Azis Muslim, R. Kusuma, and A. Arisandi, "Policy Implementation of The Electronic Traffic Law Enforcement in The Greater Jakarta Metro Area Police Jurisdiction," *Jurnal Ilmu Kepolisian*, vol. 18, no. 2, pp. 191–205, 2024, doi: 10.35879/jik.v18i2.465.
- [10] P. E. D. Antari and Valensia Angel Yoshe Situmorang, "Efektivitas Penerapan Electronic Traffic Law Enforcement (E-TLE) dalam Penegakan Aturan Lalu Lintas di Kota Denpasar," *Jurnal Hukum to-ra : Hukum Untuk Mengatur dan Melindungi Masyarakat*, vol. 10, no. 2, pp. 310–326, 2024, doi: 10.55809/tora.v10i2.357.
- [11] A. A. Aprillia, "Implementasi E-Tilang Dalam Meningkatkan Pelayanan Publik Oleh Satuan Lalu-Lintas Polres Banyumas," *Advances in Police Science Research Journal*, vol. 4, no. 1, pp. 209–280, 2020.
- [12] A. M. Alobaidallah, A. Alqahtany, and K. M. Maniruzzaman, "Safety Effectiveness of Automated Traffic Enforcement Systems: A Critical Analysis of Existing Challenges and Solutions," *Future Transportation*, vol. 5, no. 1, 2025, doi: 10.3390/futuretransp5010025.