

Effectiveness of Law Enforcement Through Electronic Ticketing and Manual Tickets on the Level of Public Compliance in Traffic

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Abstract. *This study aims to analyze the effectiveness of law enforcement through Electronic Traffic Law Enforcement (ETLE) and manual ticketing on the level of public compliance with traffic regulations in the Semarang City Police jurisdiction. This study uses an empirical legal approach (socio-legal) with quantitative methods supported by qualitative data (mixed methods). Primary data were obtained through interviews with Semarang City Police officers and road users, as well as field observations at ETLE and manual ticketing points. Secondary data were collected from laws and regulations, policy documents, and academic literature. The results show that the implementation of ETLE in Semarang significantly reduced traffic violations and increased public legal awareness. ETLE effectively minimized extortion and increased transparency of law enforcement, although limited infrastructure and lack of socialization remain challenges. Manual ticketing still has educational value due to direct interaction with violators, but is more vulnerable to abuse. Factors influencing the effectiveness of both systems include legal awareness, policy socialization, enforcement consistency, and socio-cultural conditions. Overall, an optimal combination of ETLE and manual ticketing can create a fairer, more effective, and more sustainable traffic law enforcement system to support orders and safety on the roads.*

Keywords: *Compliance; Enforcement; Law; Ticketing.*

1. Introduction

The development of information and communication technology has brought significant changes to various aspects of people's lives, including the traffic law enforcement system. The conventional traffic law enforcement system, which uses manual ticketing, has begun to transform with the advent of electronic ticketing technology, or Electronic Traffic Law Enforcement (ETLE). This transformation is part of an effort to modernize the law enforcement system, aimed at increasing effectiveness, efficiency, and transparency in handling traffic

violations (Effendi, 2017). Law Number 22 of 2009 concerning Traffic and Road Transportation has provided a strong legal basis for the implementation of traffic and road transportation in Indonesia. Over time, this law has been amended through Law Number 11 of 2020 concerning Job Creation, which provides broader space for the implementation of technology in traffic law enforcement (Hamzah, 2020).

The implementation of ETLE as a form of modern law enforcement is expected to increase public compliance with traffic regulations. The mechanism for taking action against traffic violations based on electronic recording evidence is regulated in the Regulation of the Chief of Police Number 2 of 2025 which regulates the action against traffic and road transportation violations based on electronic recording evidence, including the mechanism for using static, portable, and mobile ETLE which is integrated with the issuance of electronic traffic tickets and the identification and verification process through the ETLE Back Office (Prayogo, 2022).

Public compliance with traffic laws is an important indicator in assessing the effectiveness of the law enforcement system. In the context of a state based on the rule of law, Article 1 paragraph (3) of the 1945 Constitution of the Republic of Indonesia firmly states that "Indonesia is a state based on the rule of law." This constitutional provision serves as a fundamental basis that every citizen, including those in traffic, is obliged to comply with applicable legal provisions (Rahardjo, 2020). Semarang Regency, as one of the regions with a relatively high rate of motorized vehicle growth, faces challenges in maintaining traffic order. Data from the Semarang Police Department shows that the rate of traffic violations remains relatively high, with violations ranging from traffic sign violations, speeding violations, to vehicle document inaccuracies. This situation is increasingly concerning considering that traffic accident data in the Semarang Police Department's jurisdiction recorded 582 accidents in 2024 (Semarang Police Department, 2024).

The implementation of ETLE within the Semarang Police jurisdiction is part of a national program for the application of technology in traffic law enforcement. This system utilizes digital cameras and an integrated information system to automatically detect, record, and process traffic violations (Astuti & Gunarto, 2021). Unlike manual ticketing systems, which require the physical presence of police officers at the location of the violation, ETLE can operate automatically 24/7.

The fundamental difference between electronic and manual ticketing systems lies not only in the technology used, but also in the enforcement process. Manual ticketing provides direct interaction between officers and violators, allowing for direct education and coaching. In contrast, ETLE emphasizes the deterrent aspect through the certainty of sanctions violators will receive (Budiman &

Wahyuningsih, 2021).

The effectiveness of these two law enforcement systems in increasing public compliance is a question that needs to be answered through empirical research. Several previous studies have shown mixed results regarding the effectiveness of ETLE compared to conventional ticketing systems. Research conducted by Sari indicates that ETLE implementation can significantly reduce traffic violation rates in several regions (Sari & Gunarto, 2023).

However, other studies show that the effectiveness of ETLE is highly dependent on various factors such as socialization, the level of public legal awareness, and the consistency of law enforcement (Wibowo & Wahyuningsih, 2023). Based on this background, this study aims to analyze the influence of law enforcement through electronic ticketing (ETLE) and manual ticketing on the level of public compliance in traffic in the jurisdiction of the Semarang Police, as well as to identify factors that influence the effectiveness of the two law enforcement systems.

2. Research Method

This study uses empirical legal research (socio-legal research) with a quantitative approach supported by qualitative data (mixed methods research). Empirical legal research examines the operation of law in society, namely how the law is implemented in practice and analyzes the impact of the implementation of legal norms on social behavior (Marzuki, 2019).

This research was conducted within the jurisdiction of the Semarang Police, Central Java Province, which covers 19 sub-districts with a total area of 950.21 km². The location was selected based on geographic and demographic representativeness considerations, as Semarang Regency has representative regional characteristics with a combination of urban, semi-urban, and rural areas (Ibrahim, 2018).

Primary data was obtained through in-depth interviews with key informants consisting of Semarang Police officers and road users who had experienced ETLE and manual ticketing, including the Head of Traffic Police, Head of Traffic Ticketing, ETLE operator officers, and field officers who handled manual ticketing (Amiruddin & Asikin, 2018).

Participant observation was also conducted to observe the behavior of road users at locations where ETLE had been installed and locations that still used the manual ticketing system.

Secondary data were obtained from violation statistics, traffic accident data from the Semarang Police, policy documents in the form of laws and regulations, and academic literature in the form of previous research and legal compliance theories

(Waluyo, 2019). Quantitative data analysis used descriptive analysis and correlation analysis techniques, while qualitative data were analyzed using thematic analysis techniques through the stages of transcription, coding, categorization, and interpretation (Suteki & Taufani, 2020).

3. Results and Discussion

3.1. The Impact of Law Enforcement Through Electronic Ticketing (ETLE) on the Level of Public Compliance with Traffic Regulations in the Semarang Police Jurisdiction

a. Overview of ETLE Implementation at Semarang Police

Based on interviews with key informants, it can be identified that the implementation of Electronic Traffic Law Enforcement (ETLE) in the Semarang Police jurisdiction has been carried out through two main, complementary operational methods. First, law enforcement is carried out by using static cameras installed permanently at strategic points, such as main road intersections, traffic light areas, and arterial roads with high traffic density and potential for traffic violations. The placement of these static cameras is designed to ensure continuous traffic monitoring 24/7, so that any violations such as running red lights, exceeding the speed limit, or not wearing a seat belt can be recorded automatically and objectively. Second, the Semarang Police also operate mobile (handheld) cameras, which are special mobile phones that have gone through a process of verification and integration with the central ETLE system. These devices are used by officers in the field to capture violations that are not covered by static cameras, especially on roads that are dynamic, prone to changing conditions, or frequently used by drivers to avoid the camera-monitored route. This handheld method allows for flexibility in law enforcement, as officers can record violations directly based on actual conditions in the field. Thus, the combination of stationary cameras and mobile devices significantly increases the effectiveness, accuracy, and reach of the ETLE system in promoting traffic compliance within the Semarang Police Department.

The enforcement procedure in the Electronic Traffic Law Enforcement (ETLE) system begins when a camera, whether stationary or handheld, captures a suspected traffic violation. The recording automatically sends data in the form of a photo, the time of the incident, the location, and the type of violation to a data processing center. Once the data is received, authorized officers in the ETLE unit then conduct a verification process to ensure that the violation actually occurred, including matching the vehicle registration number, vehicle type, and the clarity of visual evidence. This verification process is crucial to avoid misidentification and potential administrative disputes in the future.

If the verification results indicate that the violation is valid, the Semarang Police Traffic Unit will then issue and send a Violation Confirmation Letter to the vehicle

owner according to the data registered with the Samsat (Vehicle Registration and Traffic Management Agency). Through this mechanism, the vehicle owner is required to appear or provide reconfirmation, either in person at the Traffic Unit office or through the official channels provided. During the confirmation stage, the vehicle owner is given the opportunity to explain whether they are the party who committed the violation, whether the vehicle is being borrowed, used by another party, or there is a technical error. After clarification has been made and the violation data is confirmed as correct and agreed upon by both parties, the police will issue an official ticket as the basis for law enforcement. The fine payment process is then carried out non-cash through the BRIVA (BRI Virtual Account) system. This digital-based payment mechanism significantly breaks the chain of direct interaction between officers and violators, thereby reducing the opportunity for extortion practices and increasing transparency and accountability in traffic law enforcement. Thus, the entire series of ETLE procedures not only streamlines the enforcement process but also strengthens the integrity of the police institution in its efforts to create a culture of orderly traffic.

b. Quantitative Data Analysis of Semarang Police ETLE (2022-2024)

Over the three years of its implementation, Electronic Traffic Law Enforcement (ETLE) within the Semarang Police Department has shown significant progress, both in terms of monitoring coverage and enforcement effectiveness. In 2022, which can be categorized as the initial phase of implementation, the ETLE system begins operating in stages, focusing on points prone to violations. Based on official data from the Semarang Police Traffic Unit as of October 2022, a total of 14,005 vehicles were caught violations from January to August 2022. This figure demonstrates that technology-based monitoring is able to detect violations more objectively and consistently, and without relying on officers in the field. Of these total violations, the police successfully issued 13,423 traffic tickets, meaning that the majority of the violation data was successfully processed and verified by the system and verification officers. The ratio of the number of vehicles captured to the number of traffic tickets successfully sent resulted in a Delivery Rate of 95.84%, a relatively high achievement for the initial phase of implementation. This high delivery rate demonstrates the effectiveness of data quality, vehicle registration number identification accuracy, and the reliable integration between the ETLE cameras and the Samsat database. Furthermore, this achievement indicates that the ETLE system is beginning to be accepted as a credible law enforcement instrument capable of providing a tangible monitoring effect on public traffic behavior (Satlantas Polres Semarang, 2024).

Entering 2023, which can be categorized as the Consolidation and Expansion Phase, the implementation of ETLE (Electronic Traffic Control System) within the Semarang Police Department has shown a significant upward trend, both in terms

of the number of recorded violations and the effectiveness of ticket delivery. During this period, the total number of violations detected by ETLE cameras ranged from 18,500 to 19,000 vehicles, representing a significant increase compared to the previous year. Of this total, the Semarang Police Traffic Unit successfully issued 17,800 to 18,200 tickets to vehicle owners, reflecting the system's and officers' ability to verify and validate violation data on a larger scale. Compared to 2022 data, the volume of recorded violations increased by 32% to 35%, marking a substantial development in the use of ETLE as a technology-based law enforcement instrument. This surge can be explained by several important factors. First, the addition of ETLE camera points in certain areas that were previously unmonitored, thus expanding the scope of surveillance and being able to detect more types of violations. Second, the local government and police intensified public outreach efforts more extensively, both through social media, banners in public spaces, and direct education to the community. These outreach efforts increased public awareness, but at the same time also resulted in more violations that had previously been missed being recorded by the system. Thus, 2023 will be a crucial period in strengthening the ETLE infrastructure as well as a phase of operational consolidation that will have a direct impact on increasing the effectiveness of traffic law enforcement in the Semarang Police area (Satlantas Polres Semarang, 2024).

In 2024, which can be categorized as the Stabilization and Optimization Phase, the implementation of ETLE in the Semarang Police Department showed a consistent but more controlled development pattern compared to the previous phase. The trend of increasing recorded violations continued, primarily due to the expansion of ETLE camera points to cover additional road sections, including high-traffic areas and alternative routes that previously lacked maximum supervision. Based on estimates and operational data, the total number of violations recorded throughout 2024 was in the range of 22,000 to 23,000 vehicles, indicating a significant increase, although not as sharp as the spike in 2023. Of this total, the Semarang Police Traffic Unit successfully processed and issued 21,200 to 22,100 traffic tickets, indicating a stable level of effectiveness in verifying and sending official documents. The ratio between the number of recorded violations and successfully issued traffic tickets indicates that the ETLE system this year has been operating at optimal capacity, both in terms of technology and the human resources involved in the verification process. Compared to 2023, the recorded increase in violation volume was in the range of 15% to 20%. This increase is more moderate than the previous year, indicating that the ETLE system has entered a more mature phase, where growth is no longer driven by large surges due to the installation of new technology, but rather by refinements to operational mechanisms, improved data quality, and strengthened integration between systems. This phase also reflects the public's adaptation to ETLE, resulting in more effective and sustainable digital law enforcement (Semarang Police Traffic Unit, 2024).

c. Analysis of Dominant Types of Violations

During the three-year implementation of ETLE, the pattern of recorded violations showed relatively stable consistency, although there were changes in proportions in certain categories. Failure to wear a helmet continued to be the most dominant violation. However, the percentage showed a gradual downward trend, indicating that ongoing outreach, public education, and law enforcement efforts are beginning to have a positive effect on driver behavior. This decline also reflects increasing public awareness of the importance of helmet use as a basic safety measure when driving. In 2022, the initial year of ETLE-based data collection, failure to wear a helmet was recorded at 45%, equivalent to 6,302 cases, of the total recorded violations. Furthermore, other types of violations also showed significant distribution. Violations of traffic signs ranked second with 25%, or 3,501 cases, illustrating that compliance with road markings and signs remains a challenge for some drivers. Speeding violations accounted for 15%, or 2,101 cases, confirming that aggressive driving behavior still requires further monitoring. Meanwhile, violations involving not wearing seat belts were recorded at 10%, or 1,401 cases, indicating that seat belt use by drivers and passengers is not yet fully complied with, especially in four-wheeled vehicles. Other violation categories, which include various forms of non-compliance such as using a cell phone while driving or technical vehicle violations, were around 5%, or 700 cases. Overall, the distribution of violation types in 2022 provides an initial overview of patterns of public non-compliance and serves as a basis for evaluating law enforcement policies in subsequent years (Semarang Police Traffic Unit, 2024).

Entering 2023, the distribution pattern of violations recorded through the ETLE system shows a shift in percentages across several categories, indicating changes in public driving behavior and increased monitoring effectiveness. Failure to wear a helmet, while still the most common type of violation, experienced a proportional decline to 42%, or approximately 7,770 cases. This decline is in line with intensified road safety awareness campaigns, both through public campaigns and direct law enforcement by the police. Conversely, violations involving traffic signs increased to 28%, or 5,180 cases, indicating that despite increased awareness of helmet use, compliance with traffic signs remains a significant challenge. Speeding violations also increased to 18%, or 3,330 cases, indicating a trend toward aggressive driving behavior, particularly on arterial roads and expressways monitored by ETLE. Meanwhile, failure to wear a seatbelt decreased to 8%, or 1,480 cases, reflecting increased awareness of basic safety standards among four-wheeled vehicle drivers. Other categories remained at 4%, or 740 cases, relatively stable compared to the previous year. In 2024, this trend of change continues with a narrowing pattern. Violations of not wearing a helmet anymore experienced a proportional decline to 40%, or approximately 8,800 cases, demonstrating the continued positive impact of educational and repressive policies. Meanwhile, violations of traffic signs continued to increase, reaching

30%, or 6,600 cases, highlighting the need for strengthened education and traffic engineering to reduce non-compliance with traffic signs. Excessive speeding violations also showed an upward trend, reaching 20%, or 4,400 cases, indicating that speed remains a major risk factor for road safety. Overall, the dynamics of changes in the percentage of violations in 2023 and 2024 reflect the community's adaptation to ETLE-based law enforcement and indicate areas requiring further policy intervention (Satlantas Polres Semarang, 2024).

d. Infrastructure Expansion and Community Response

The surveillance coverage of the Electronic Traffic Law Enforcement (ETLE) system within the Semarang Police Department has significantly expanded over the past three years. In 2022, the initial operational phase of ETLE only included an average of nine active surveillance points, most of which were located at major intersections and roads with a relatively high risk of violations. While still limited, these points laid the foundation for building a technology-based surveillance system in the region. Entering 2023, the surveillance coverage was expanded with the addition of several new cameras, bringing the total number of active ETLE points to 13.5, an increase of 4.5 points compared to the previous year. This expansion was carried out strategically, namely by placing devices in routes previously known as blind spots in surveillance, alternative routes frequently used to avoid camera monitoring, and areas experiencing increased traffic flow. This expansion not only broadened the coverage but also improved the system's ability to detect a wider variety of violations. In 2024, the development of ETLE infrastructure accelerated again with the addition of 19 monitoring points, an increase of 5.5 points from 2023. This significant growth is part of a system optimization strategy, which not only expands the scope of regional monitoring but also improves the quality of monitoring by placing cameras at previously unreachable points. This expansion has been proven to directly contribute to the increase in the volume of recorded violations, as more roads are monitored and opportunities for drivers to commit violations are reduced. Overall, the growth in the number of ETLE points from year to year reflects the Semarang Police's commitment to strengthening its technology-based traffic law enforcement system and demonstrates a clear correlation between the expansion of monitoring coverage and the increased effectiveness of violation detection (Semarang Police Traffic Unit, 2024).

Based on interviews with key informants, it can be concluded that public response to the implementation of Electronic Traffic Law Enforcement (ETLE) in Semarang Regency has generally been positive and shows increasing acceptance over the years. The public generally appreciates this system because it is considered capable of providing a more transparent, objective, and human-intervention-free law enforcement process. Many residents believe that the use of technology can reduce the subjectivity of officers' assessments in the field, ensuring that every

recorded violation is truly based on clear, undisputed visual evidence. Furthermore, the online fine payment mechanism through the banking system has also received positive feedback. This process is considered highly effective in minimizing the potential for extortion, which has long been a classic issue in traffic law enforcement. Furthermore, reducing physical interaction between officers and violators is considered capable of reducing the potential for conflict, debate, or confrontation that often arises during manual enforcement. Process efficiency, procedural certainty, and ease of access are factors that contribute to the public's positive perception of ETLE. However, interviews also revealed non-compliant behavior from some members of the public, indicating that the adaptation process is still not fully optimal. Some residents still lack the awareness to quickly follow up on Violation Confirmation Letters and Traffic Tickets, resulting in delays in the verification process and payment of fines. Furthermore, manipulative practices are still being found to avoid ETLE camera detection, such as removing license plates, covering them with dark plastic, or using additional accessories that disguise the numbers on the plates. These actions not only reflect efforts to avoid law enforcement but also indicate room for improvement in terms of legal education, supervision, and firm action against attempts to manipulate vehicle identities. Overall, although public acceptance of ETLE tends to be positive and shows encouraging progress, there are still a number of behavioral challenges that need to be addressed through a more comprehensive approach, both through public education and consistent law enforcement (Basuki, Loc. Cit.).

e. Analysis of ETLE Effectiveness Based on Friedman's Legal System Theory

Based on Lawrence M. Friedman's legal system theory, which emphasizes that the effectiveness of a legal system is determined by three main components: legal structure, legal substance, and legal culture, the implementation of Electronic Traffic Law Enforcement (ETLE) at the Semarang Police can be analyzed more deeply and comprehensively. This approach allows for an evaluation that focuses not only on the technical aspects of law enforcement, but also on institutional quality, normative conformity, and the level of public acceptance of technology-based law enforcement mechanisms. Through Friedman's analytical framework, ETLE implementation can be understood as a system that works in the interaction between institutional devices that carry out law enforcement, the rules that form the basis of its operation, and the behavior of the public as the subject of supervision. Thus, this theory provides a strong conceptual foundation for assessing the extent to which ETLE has functioned optimally and what factors still need to be improved to increase its effectiveness in the future (Friedman, 2019).

From a legal structure perspective, the implementation of ETLE at the Semarang Police Department has shown significant progress over the past three years. The infrastructure expansion from just 9 ETLE points in 2022 to 13.5 points in 2023, and finally reaching 19 points in 2024, illustrates the strengthening of the

institutional structure that supports technology-based law enforcement. This increase in the number of monitoring points demonstrates that the police institution is not only improving its technical capacity but also building a more comprehensive and equitable monitoring network across its jurisdiction. Furthermore, the use of two operational methods: static cameras installed at strategic points and mobile (handheld) cameras used by officers in the field, provides structural flexibility in detecting various forms of violations. The Central Java Police's strict verification procedures, including data validation before issuing confirmation letters and tickets, reflect a legal structure that operates in an organized, accountable, and prudent manner. From a legal substance perspective, the implementation of ETLE at the Semarang Police Department is based on strong and clear regulations, namely Article 267 of Law No. 22 of 2009 concerning Traffic and Road Transportation and Government Regulation No. 80 of 2012, which regulates procedures for vehicle inspections and enforcement of violations. These two regulations provide normative legitimacy for the use of technology as a means of law enforcement, including mechanisms for collecting electronic evidence and issuing traffic tickets without the physical presence of officers in the field. The consistency of the application of legal substance is reflected in the violation data detected over the past three years, where the most dominant type of violation is not wearing a helmet with a proportion of 40–45%, followed by violating traffic signs at 25–30%, and violations of excessive speeding at around 15–20%. This pattern indicates that the legal norms specified in the law and its implementing regulations have been effectively translated through the ETLE system, thus being able to identify violations objectively and consistently in accordance with applicable legal standards. Overall, the legal substance aspect shows that the existing regulatory instruments have been running in line with the needs of modern technology-based law enforcement (Atmasasmita, 2019).

From a legal culture perspective, the increase in fine payment compliance from 67.5% in 2022 to 77.5% in 2024 indicates a shift in public legal behavior toward greater compliance and responsiveness to regulations. This trend indicates that the public is beginning to recognize the legal consequences of each violation and understands that law enforcement through ETLE is more objective due to minimal direct interaction between officers and violators. Furthermore, the public's positive response to the transparency, accuracy, and objectivity of the ETLE system reflects a growing level of public trust in the police institution. This acceptance also confirms that the public is increasingly ready to accept technology-based law enforcement modernization, where the traffic monitoring process is considered fairer, non-discriminatory, and free from illegal levies. Thus, modernization through ETLE not only strengthens the effectiveness of law enforcement but also encourages the formation of a more progressive, rational, and compliance-based legal culture (Kusuma & Purnawan, 2022).

f. Analysis of Behavioral Change Based on the Theory of Planned Behavior

Referring to the Theory of Planned Behavior proposed by Icek Ajzen, changes in public behavior in the context of compliance with ETLE can be analyzed through three main factors, namely attitude toward behavior, subjective norms, and perceived behavioral control. Within this framework, it can be understood that public attitudes toward ETLE, such as the perception that this system is fairer, objective, and free from extortion, provides an internal drive to comply. Furthermore, subjective norms, including social encouragement from the family, the workplace, or the community of road users who begin to consider compliance as a new standard of behavior, also strengthen the public's tendency to follow the rules. Meanwhile, perceived behavioral control, such as the ease of checking the status of violations, the ease of paying fines online, and the certainty that violations will be recorded by cameras, fosters the belief that compliance with traffic regulations is something that is easy to do and within the individual's control. Thus, analysis using the Theory of Planned Behavior provides a comprehensive picture that increased compliance with ETLE is not only due to sanctions, but also due to changes in attitudes, social influence, and perceptions of convenience that simultaneously shape compliant behavior in society (Ajzen, 2019).

Data shows a shift in public attitudes toward traffic compliance. The decline in the percentage of violations involving non-helmet use from 45% in 2022 to 40% in 2024 illustrates a shift in positive public attitudes toward the use of personal protective equipment, particularly helmets, as a primary safety instrument. This trend can be understood as a result of increased awareness of the risk of accidents and the belief that helmet use provides tangible benefits in protecting oneself. Furthermore, the implementation of ETLE has been shown to shift subjective norms in society, where the presence of surveillance cameras functions not only as a means of detecting violations but also as a social control mechanism that reinforces the perception that every traffic violation will be recorded and potentially subject to sanctions. This condition creates a new social situation that encourages people to reprimand, remind, or model compliant behavior as part of a shared social standard. In other words, ETLE plays a role in shaping the general perception that compliance is no longer simply a moral choice but a social expectation that is understood, accepted, and implemented by road users. This change in subjective norms reinforces the transformation of traffic behavior to become more orderly and responsible (Prasetyo & Barkatullah, 2019).

The ETLE system increases public perception that every traffic violation will be more easily detected and automatically sanctioned. This condition strengthens perception behavioral control, namely the belief that a person must manage their actions more carefully because of the clear and unavoidable legal consequences. The public then feels a practical obligation to behave compliantly to avoid potential administrative sanctions and the complexity of the legal process. Furthermore, the presence of ETLE also creates a strong psychological deterrent

effect. Road users become more cautious because they know that cameras can record every violation without the need for an officer's direct presence. This impact aligns with Albert Bandura's social learning theory, which emphasizes that individual behavior is largely influenced by the process of observation. When people see others being sanctioned for being caught on camera, for example through stories, family experiences, or news reports, they learn that violations carry real consequences. Through this observational mechanism, ETLE not only technically enforces the law but also forms a new mindset that compliance is the safest and most rational choice. Thus, changes in public behavior occur not only because of the rules, but also because of the internalization of socially observed consequences (Fuady, 2018).

3.2. The Influence of Law Enforcement Through Manual Ticketing on the Level of Public Compliance with Traffic Regulations in the Semarang Police Jurisdiction

a. Analysis of Semarang Police Manual Traffic Ticketing Data (2022-2024)

Based on data from the Semarang Police's traffic ticketing accountability report, patterns and trends in law enforcement through the manual ticketing mechanism during the 2022–2024 period can be identified, illustrating the dynamics of public compliance and the effectiveness of direct enforcement by officers in the field. In December 2022, 95 manual ticketing cases were recorded, with a settlement or fine settlement rate of 82.1% (78 cases resolved out of a total of 95). This figure indicates that most violators prosecuted manually still demonstrate a relatively high level of responsibility in fulfilling their fine settlement obligations, despite the potential for direct interaction between officers and violators that often leads to obstacles such as negotiations or arguments at the scene. The types of violations prosecuted also show a typical pattern of common violations frequently encountered in manual law enforcement. The violation of not carrying a driver's license (SIM) was the most dominant, at 30 cases (31.6%), illustrating the still low discipline of some drivers in carrying legal driving documents. The violation of not wearing a helmet came in second place with 25 cases (26.3%), reflecting that safety aspects are still not fully prioritized for some road users, especially motorcycle riders. Furthermore, the violation of not carrying a vehicle registration certificate (STNK) occurred in 22 cases (23.2%), confirming the tendency of drivers to ignore administrative vehicle obligations. The violation of running red lights (18.9%) indicates that non-compliance with traffic signs and lights remains significant and has the potential to lead to a high risk of accidents. Overall, the December 2022 data illustrates that manual ticketing remains an important and effective law enforcement instrument in addressing conventional violations, but also emphasizes the need for a more modern and minimally interactive approach, such as ETLE, to increase transparency, accountability, and consistency of law enforcement in the field (Semarang Police Traffic Ticket Report, 2022).

In December 2023, the volume of manual ticketing increased to 108 cases,

reflecting intensified law enforcement and increased vehicle activity during that period. The case resolution rate also improved compared to the previous year, reaching 86.1%, or 93 resolved cases. This increase in the settlement rate indicates increasing public awareness of the need to follow up on ticketing sanctions, while also reflecting the effectiveness of communication and ticket administration mechanisms implemented by the Semarang Police. The weekly distribution of enforcement patterns also shows interesting dynamics. The first week recorded the highest number of tickets at 38, which then gradually decreased in the following weeks, reaching 20 cases in the fourth week. This downward trend may indicate several factors, including increased driver vigilance following enforcement in the first week, or the influence of higher patrol and operational intensity at the beginning of the month. In terms of violation types, the composition of violations in December 2023 showed consistency with the previous year's pattern. Failure to wear a helmet was the most dominant violation with 32 cases (29.6%), followed by failure to carry a driver's license with 30 cases (27.8%). The dominance of these two violations confirms that safety and compliance with road administration remain key issues for some road users. However, the increasing rate of ticket resolution indicates a positive shift in public compliance with legal obligations after receiving a penalty. Overall, the December 2023 data demonstrates that manual ticketing continues to play a crucial role in maintaining traffic discipline and serves as an indicator that can be used to evaluate the effectiveness of the ETLE policy as a more modern and less interactive law enforcement mechanism (Semarang Police Traffic Ticket Report, 2022).

In December 2024, the volume of manual ticketing showed a slight increase to 110 cases, indicating that despite the increasing dominance of the ETLE system, conventional law enforcement still plays a crucial role in addressing violations that cannot be detected by cameras. The ticket resolution rate was 85.5%, or 94 cases were successfully settled, illustrating that post-enforcement compliance remains relatively stable and has been trending positively over the past three years. In terms of violation types, failure to carry a driver's license emerged as the most prevalent violation with 35 cases (31.8%), displacing the violation of not wearing a helmet, which had been more prominent in previous years. This could reflect several possibilities, such as increased awareness of helmet use as a safety device and the increased effectiveness of road safety outreach. Failure to wear a helmet came in second with 30 cases (27.3%), indicating that despite improvements, compliance with safety equipment use still needs to be strengthened through education and enforcement. The downward trend in the number of tickets from week to week also remained consistent with the previous year. From the first to the fourth week, there was a 57.5% decrease in ticket volume, indicating a tendency for drivers to be more cautious following the intensified enforcement at the beginning of the month. This downward trend also suggests that the deterrent effect of manual ticketing remains effective, particularly in the short period after

the public witnesses or learnings of raids or enforcement in the field. Overall, the December 2024 data confirm that, despite the continued development of ETLE as a modern law enforcement system, manual ticketing remains an important corrective tool, particularly in addressing administrative violations and driving behaviors that are beyond the reach of electronic devices. The trend of compliance and the decline in certain violations also indicates a shift in public legal culture toward a more positive perspective on traffic safety and discipline (Semarang Police Traffic Ticket Report, 2022).

b. Three-Year Comparative Analysis

A comparative analysis of manual ticketing data over three years (2022–2024) revealed several important findings that illustrate the dynamics of traffic law enforcement within the Semarang Police Department. First, there is a consistent upward trend in ticket volume, although at varying rates. In 2022, 95 cases were recorded, increasing to 108 cases in 2023, a 13.7% increase, indicating an intensification of enforcement and an increase in violations found during that year. However, in 2024, the increase only reached 1.9%, with a total of 110 cases, indicating that the growth trend has entered a stable phase. This slowdown in growth can be interpreted as an indication of increased public compliance or a stronger deterrent effect due to the combination of ETLE and manual ticketing. Second, the pattern of violations over the three years shows clearly consistency. Administrative violations such as not carrying a driver's license and not wearing a helmet consistently remain the most dominant type of violation, accounting for more than 57% of all violations prosecuted each year. The dominance of administrative violations confirms that some people still face fundamental issues related to legal awareness and compliance with administrative driving obligations. This consistent pattern also indicates that outreach and education efforts still need to be strengthened, particularly regarding complete driver identification and the use of safety equipment. Third, the settlement rate for traffic tickets shows a clear positive trend. From 82.1% in 2022, the settlement rate increased to 86.1% in 2023, before stabilizing at 85.5% in 2024. This increase and stability in figures reflects that the ticket resolution mechanism, both administratively and in terms of the payment system, has become increasingly effective. The public also appears more cooperative in following up on sanctions, an indicator of a growing culture of legal compliance. Overall, these findings demonstrate that although manual ticketing is no longer the primary instrument in traffic law enforcement due to the development of ETLE, its role remains highly strategic in addressing violations beyond the reach of electronic systems. In addition, the consistency of violation patterns and the increase in the level of settlement indicates a gradual transformation of legal culture towards a more orderly and legally aware society (Semarang Police Traffic Unit, 2024).

c. Advantages and Disadvantages of Manual Ticketing

Based on the concept of manual ticketing, this conventional enforcement system has interactive, responsive, and situational characteristics, which are fundamentally different from electronic-based law enforcement mechanisms. Manual ticketing emphasizes not only recording violations but also the active role of officers in observing, assessing, and determining appropriate action based on conditions on the ground. In this context, manual ticketing is understood as a process that relies heavily on the professional skills, empirical experience, and moral and legal considerations of police officers. These characteristics provide a human dimension to law enforcement, as officers can consider specific situations, the reasons for the violation, the driver's condition, and even safety risks that may not be captured by the ETLE system. For example, officers can provide direct education, conduct on-site coaching, or consider certain urgent factors that cannot be evaluated by cameras. Thus, manual ticketing functions not only as a means of law enforcement but also as an instrument for social development and personalized legal education. This fundamental difference emphasizes that while ETLE offers objectivity and efficiency, manual ticketing is still necessary to handle violations that require human judgment, such as violations not captured by cameras, certain administrative violations, or situations requiring direct intervention. Therefore, according to Rusli Effendi's perspective, manual ticketing still has a strategic position as a complement and reinforcement of the modern law enforcement system, maintaining a balance between technology, officer professionalism, and humanitarian values in traffic law enforcement (Effendi, 2017).

Manual ticketing has several strategic advantages that remain relevant in modern law enforcement systems, even as technology like ETLE continues to evolve. First, manual ticketing has a powerful educational aspect, as officers can directly explain to violators the nature of the violation, its potential dangers, and its impact on traffic safety. Through this face-to-face communication, violators not only receive sanctions but also gain a more comprehensive understanding of the rationale behind the regulations. This direct interaction often creates a more effective learning experience than simply receiving a ticket electronically. Second, manual ticketing offers significant flexibility in case handling. Officers in the field can make situational considerations, for example, considering the offender's condition, the urgency of the situation, or the level of risk posed by the violation. In certain situations, officers can issue warnings for minor

violations or first-time offenders. This flexibility not only strengthens the humanistic aspect of law enforcement but also encourages more proportionate, fair, and contextual enforcement. Third, manual ticketing has the ability to detect violations that electronic systems cannot. Some violations require direct observation and human analytical skills, such as violations related to vehicle conditions (eg, malfunctioning lights, non-compliant exhausts, overloading), dangerous driver behavior (such as zigzagging, overtaking on the shoulder, or

driving in an unsafe condition), and violations that require subjective judgment based on the officer's intuition and experience. ETLE, while highly effective in detecting certain visual violations, still has limitations in interpreting the context and dynamics of driver behavior. Therefore, manual ticketing still has functional and humanitarian value that cannot be completely replaced by technology. In practice, manual ticketing and ETLE complement each other, creating a more comprehensive and adaptive law enforcement system (Hamzah, 2020).

However, manual ticketing also has a number of inherent weaknesses that need to be considered in the context of modernizing law enforcement. First, there is limited oversight coverage because manual ticketing is highly dependent on the availability, capacity, and mobility of officers in the field. This situation means that not all locations or times can be optimally monitored, especially in areas with high traffic volumes or areas with large surveillance areas. Limited human resources are a major factor limiting the effectiveness of manual ticketing compared to electronic systems that can operate 24/7. Second, manual ticketing has the potential for subjectivity in law enforcement. Assessments and approaches between officers are not always consistent, which can lead to differences in determining action for the same violation. Factors such as experience, perception, situational pressure, and the psychological state of officers can influence decisions in the field. This inconsistency can impact public perceptions of justice and legal certainty. Third, the direct interaction between officers and violators opens up opportunities for corruption or extortion. Bargaining, informal negotiations, or non-procedural compromises can occur during enforcement, especially in the absence of robust oversight mechanisms. This has the potential to undermine public trust in the integrity of law enforcement. Fourth, from an efficiency perspective, manual ticketing is considered ineffective because one officer can only handle one case at a time. The enforcement process, which involves stopping vehicles, checking documents, recording violations, and on-the-spot education, takes a significant amount of time. As a result, the number of violators who can be prosecuted in a single period is relatively limited compared to ETLE, which can process thousands of violations automatically and simultaneously. Overall, these weaknesses demonstrate that while manual ticketing has an important function and humanitarian value, modernization through electronic systems such as ETLE remains a necessity to increase transparency, objectivity, and efficiency of traffic law enforcement in Indonesia (Soekanto, 2018).

d. Impact of Manual Ticketing on Public Compliance

Based on empirical data, manual ticketing has been shown to have a significant educational impact in shaping driver behavior. Direct interaction between officers and violators allows for a personalized, contextual, and situational learning process, where officers not only deliver sanctions but also explain safety risks, the importance of compliance, and the purpose of traffic regulations. This form of

face-to-face communication often creates a deeper understanding than impersonal electronic mechanisms. The consistent settlement rate for manual ticketing sanctions, which is in the range of 82–86%, indicates that the public has a fairly high level of trust in this conventional law enforcement mechanism. This high settlement rate reflects that the public views the manual ticketing process as fair, transparent, and accountable, particularly because they can interact directly, provide reasons or clarifications, and receive rational explanations from officers in the field. This empirical finding aligns with the theory of procedural legitimacy proposed by Tom R. Tyler, which asserts that compliance with the law is influenced not only by the threat of sanctions but is more determined by public perceptions of the legitimacy of legal authority and the fairness of enforcement procedures. When people feel treated fairly, respected, and given the opportunity to understand the rationale for enforcement, their compliance levels increase significantly. In this context, manual ticketing provides a space for human interaction that can strengthen perceptions of procedural justice and ultimately encourage more sustainable legal compliance. Thus, the educational function and procedural legitimacy inherent in manual ticketing make it a crucial component of the traffic law enforcement system, even as ETLE technology becomes increasingly dominant. These two systems, when harmoniously integrated, can create law enforcement that is not only efficient but also oriented toward the formation of a strong legal culture (Tyler, 2020).

A transparent manual ticketing process, where violators can directly identify the type of violation committed, see evidence of the violation at the scene, and receive a verbal explanation from the officer, inherently fosters a strong sense of procedural justice. This transparency not only provides legal certainty but also creates a space for dialogue that allows violators to understand the reasons for the action and the normative basis for the officer's decision. In the context of law enforcement, this form of interaction plays a crucial role in strengthening public perceptions of the integrity, accountability, and professionalism of police officers. The trust that grows from these procedurally fair experiences constitutes invaluable social and institutional capital, particularly amidst the transformation towards digital systems such as ETLE. Therefore, the digitalization of law enforcement needs to maintain the elements of transparency, communication, and persuasiveness that have been the main strengths of the manual ticketing mechanism (Rahardjo, 2020).

e. Comparison of the Effectiveness of ETLE and Manual Ticketing

From an efficiency perspective, ETLE clearly demonstrates significant advantages, particularly in terms of coverage and consistency of enforcement. Through camera technology and an automated surveillance system, a single ETLE unit can monitor multiple locations simultaneously and detect a wide variety of violations without time constraints or the need for physical personnel deployment. This not

only increases monitoring capacity but also minimizes the potential for human error and ensures more objective and sustainable enforcement. In contrast, manual ticketing relies entirely on the presence of officers in the field, so its effectiveness is heavily influenced by the number of personnel, situational conditions, and daily operational dynamics. However, from an educational perspective, manual ticketing demonstrates advantages that cannot be fully replaced by digital systems. Direct interaction between officers and violators allows for a two-way communication process that is personalized, contextual, and persuasive. In this situation, violators can receive a more comprehensive explanation of the legal basis, the risks of dangerous behavior, and the importance of complying with traffic regulations. This dialogic mechanism provides a more in-depth corrective experience than electronic approaches, which tend to be administrative in nature and do not provide a direct moment for reflection. Thus, both systems have their respective advantages that need to be considered proportionally in formulating an ideal traffic law enforcement policy (Kusuma & Purnawan, 2022).

ETLE provides more consistent treatment because it operates based on predetermined technical parameters, so that any violation that meets the algorithmic indicators will be prosecuted without being influenced by officer subjectivity. This consistency creates greater legal certainty, reduces the potential for differences in assessments, and strengthens the principle of equality before the law in traffic law enforcement. Conversely, manual ticketing still allows officers to use situational justice considerations, such as issuing warnings to first-time violators or considering specific emergency conditions. This flexibility can provide a sense of substantive justice, but at the same time, it has the potential to create inconsistencies between officers and between regions if not balanced with strict operational standards. Therefore, these two enforcement mechanisms should not be viewed as mutually exclusive approaches, but rather as complementary instruments in an integrated traffic law enforcement system. ETLE can ensure broad, objective, and ongoing oversight, while manual ticketing remains necessary to address violations that require human judgment, field context, or immediate corrective action. The synergy between the two has the potential to create a more effective, proportional, and adaptive traffic law enforcement model to the various characteristics of violations in the field (Hartono & Sulchan, 2022).

3.3. Factors Influencing the Effectiveness of Traffic Law Enforcement Through ETLE and Manual Ticketing on the Level of Public Compliance in the Semarang Police Jurisdiction

a. Technology and Infrastructure Factors

Data shows a significant expansion of ETLE infrastructure, from only 8-10 points in 2022 to 18-20 points in 2024. This expansion is not only quantitative but also

qualitative with the addition of camera types, both fixed and mobile cameras, thus expanding reach and increasing operational flexibility (Basuki, Loc. Cit.).

The expansion of ETLE infrastructure creates a "ubiquitous surveillance" effect, the perception that monitoring is taking place at all times and in multiple locations. This aligns with the deterrent theory, which emphasizes that certainty of punishment is more effective than severity in deterring violations. Increasing the number of monitoring points from 8 to 20 theoretically increases the probability of detection by up to 150%, significantly impacting perceived risk in calculating the costs and benefits of potential violators (Chambliss & Seidman, 1971).

Despite showing progress, the ETLE system still faces significant infrastructure challenges, particularly its reliance on the internet and the need for ongoing maintenance. Network instability can create loopholes in law enforcement, potentially compromising the system's credibility and reliability. Another major obstacle is outdated vehicle data, particularly related to the unorganized vehicle registration process, which has led to the failure to deliver electronic traffic tickets to the correct vehicle owners (Iskandar, 2022).

b. Direct Law Enforcement Factors (Manual Ticketing)

Manual ticketing data shows a consistent operational pattern, with peak activity occurring in the first week of each month. The physical presence of officers creates an immediate deterrent effect, unlike the ETLE system. This effect is situational and temporary, particularly strong at the time and location of the officer's presence, but limited in time and territory (Semarang Police Traffic Unit, 2024).

This direct interaction serves not only as a form of punishment but also as an educational opportunity, an opportunity to explain traffic regulations and the consequences of violations. This educational aspect is not present in the ETLE system, making manual ticketing advantageous in fostering compliance based on awareness of norms (Purnawan, 2021).

c. Economic Factors and Ease of Administration

The target of optimizing the ease of ETLE payments by 2024 reflects the recognition that fine payment transaction costs are a critical factor in improving compliance. Diversifying payment channels, such as through banks, e-wallets, and online platforms, reduces compliance costs and increases convenience. Data shows that approximately 30-35% of vehicles had their vehicle registrations (STNK) blocked due to non-payment of ETLE fines in 2022. This administrative sanction is a highly effective secondary enforcement mechanism because it directly affects people's mobility rights. The STNK blocking sanction not only has economic impacts but also psychological ones, causing significant stigma and discomfort (Fauzi, 2022).

d. Socio-Psychological Factors

The 35% increase in ETLE ticket volume by 2023, which occurred concurrently with manual ticketing, has created a heightened risk perception among the public. Data shows that ETLE, with its automated nature and continuous monitoring, is more effective in establishing certainty of punishment compared to sporadic manual ticketing (Beccaria, 2018). The decrease in the proportion of "not wearing a helmet" violations in both enforcement systems demonstrates the successful internalization of safety norms. This indicates that sustained law enforcement can change social norms and create more sustainable normative compliance than instrumental compliance driven solely by fear of sanctions (Kelman, 2019).

e. Policy and Regulatory Factors

The week-over-week decreasing number of tickets in manual ticketing data suggests a possible temporal regularity that could lead potential violators to adjust their behavior. Several studies have shown that random law enforcement, unpredictable in terms of time and location, is more effective in creating a lasting deterrent effect (Wignjosoebroto, 2020).

The elimination of illegal levies and the implementation of accurate digital documentation are significant advances in fair law enforcement. This transparency not only reduces opportunities for corruption but also builds public trust in the legitimacy of the law enforcement system (Mahfud MD, 2021).

f. Analysis of Factors Based on Soerjono Soekanto's Theory

Based on the theory of five factors that influence law enforcement according to Soerjono Soekanto, factors that influence the effectiveness of ETLE and manual ticketing at the Semarang Police can be identified (Soekanto, Op.Cit.).

First, legal factors (regulations) legislation). ETLE's strong legal basis is based on Law No. 22 of 2009 and Government Regulation no. 80 of 2012 provides clear legitimacy for the system's implementation. Manual ticketing regulations are well-established and clear, but adaptation is needed to integrate with the digital system (Kansil, 2019). Second, law enforcement factors. ETLE implementation requires officers with technical competence to operate the system and verify data. Data shows that only certified officers can operate mobile ETLE devices, reflecting the importance of competency standards. ETLE has reduced the potential for corruption by minimizing direct interaction through the cashless payment system via BRIVA (Basuki, Loc. Cit.). Third, infrastructure and facilities factors. The expansion of infrastructure from 9 to 19 ETLE points demonstrates a commitment to providing adequate facilities. However, technical constraints such as internet network stability and camera quality remain challenges (Semarang Police Traffic Unit, 2024). Fourth, community factors. The increase in the level of compliance with fine payments from 67.5% to 77.5% indicates increased public legal

awareness. The positive response to ETLE transparency reflects public acceptance of modernized law enforcement (Ali, 2019). Fifth, cultural factors. Changes in the community's legal culture toward the acceptance of technology in law enforcement are a crucial factor. Changes in social norms related to traffic compliance, such as a decrease in the percentage of violations involving not wearing a helmet, indicate a positive impact of both law enforcement systems (Pratama & Hafidz, 2022).

g. Inter-institutional Coordination Factors

The implementation of a joint operation involving the Traffic Police, the Regional Revenue Agency (Dispenda), and the Transportation Agency (Dishub) demonstrates the importance of inter-agency coordination. This strategy allows the public to complete administrative obligations (such as vehicle tax payments) and traffic ticket fines in a single location, thereby increasing compliance. Coordination with the Central Java Regional Police (Polda) regarding officer certification and standardization of ETLE procedures also demonstrates the importance of policy harmonization across levels of government (Basuki, Loc. Cit.). Handling violating vehicles with out-of-region license plates requires more complex coordination, which poses a challenge in implementing a regional law enforcement system. This aligns with Chambliss and Seidman's theory of legal effectiveness, which emphasizes the importance of synergy between institutions in law implementation (Chambliss & Seidman, Op.Cit.).

h. Technology Factors and System Integration

In the digital era, technology and infrastructure are becoming increasingly important in traffic law enforcement. Adequate information and communication technology infrastructure is a prerequisite for implementing systems such as ETLE. The quality and reliability of technological systems also influence public trust in law enforcement (Asshiddiqie, 2022).

The ability to integrate ETLE with various other information systems, such as vehicle databases, payment systems, and the judicial system, is key to the successful implementation of ETLE nationally. Coordination with the Vehicle Registration Agency (Samsat) and dealers to update vehicle ownership data is a crucial strategy to overcome the challenge of data inaccuracy (Siahaan, 2021).

i. Sustainability and Sustainability Factors

The ability to finance long-term system operations and maintenance impacts implementation sustainability. Similarly, the ability to keep up with technological developments and regularly upgrade systems impacts long-term effectiveness. Sustained public acceptance and support for the law enforcement system impacts its long-term legitimacy and effectiveness (Hadjon, 2020).

3.4. Comprehensive Discussion

a. Synthesis of Research Findings

Based on data analysis and field findings, the implementation of ETLE and manual ticketing within the Semarang Police jurisdiction has significantly impacted public compliance with traffic laws. Research findings indicate that both law enforcement systems have distinct yet complementary characteristics, strengths, and weaknesses (Sari & Gunarto, Op.Cit.).

ETLE has proven effective in improving law enforcement effectiveness, as demonstrated by the significant increase in the volume of violations detected and processed annually. The digital ETLE system has successfully suppressed extortion practices and provided strong, legally accountable evidence. There has been a change in driver behavior (deterrent effect), demonstrated by a decrease in the percentage of violations involving not wearing helmets and increased compliance with fines. The contactless ETLE mechanism has also created a more conducive and professional law enforcement environment (Semarang Police Traffic Unit, 2024).

On the other hand, manual ticketing remains highly relevant in the traffic law enforcement system. The educational aspect, through direct interaction between officers and violators, provides a learning dimension that cannot be replaced by electronic systems. The consistently high sanction resolution rate (82-86%) reflects the system's effectiveness and public trust in the direct law enforcement process (Semarang Police Traffic Ticket Report, 2022–2024).

b. Theoretical Implications

The findings of this study contribute to the development of law enforcement theory in the context of modern technology. Based on Friedman's legal system theory, the implementation of ETLE at the Semarang Police shows that modernizing legal structures through technology must be balanced with strengthening legal substance and changing the legal culture of society (Friedman, Op.Cit.). Hart and Tyler's legal compliance theory also received empirical confirmation, where public compliance is not only influenced by external factors (fear of sanctions) but also by internal factors (acceptance of the system's legitimacy). This is evident in the public's positive response to the transparency and objectivity of ETLE (Tyler, Op.Cit.).

Chambliss and Seidman's theory of legal effectiveness is also relevant in this context, where the effectiveness of law enforcement is influenced by the complexity of social, economic, and political factors operating within implementing agencies. Inter-agency coordination and data synchronization are key factors influencing the successful implementation of law enforcement systems (Chambliss & Seidman, Op.Cit.).

c. Practical Implications

From a practical perspective, this study provides recommendations for optimizing the implementation of ETLE and manual ticketing. First, the expansion of ETLE camera locations needs to be continuously carried out, taking into account analysis of points prone to violations and accidents. Second, improving the quality and reliability of technological infrastructure must be a priority to maintain the system's credibility. Third, system integration with the vehicle ownership database needs to be strengthened to overcome the problem of data inaccuracy (Basuki, Loc. Cit.). For manual ticketing, the focus should be directed towards strengthening the educational function and handling special cases that cannot be handled by the electronic system. Standardization of procedures and improving officer competency through continuous training are also needed to improve the consistency and professionalism of law enforcement (Hamzah, Op.Cit.).

d. Limitations and Recommendations for Further Research

This study has several limitations that should be considered. First, the available quantitative data is limited to a three-year period (2022-2024), making it impossible to conduct a comprehensive long-term trend analysis. Second, this study focuses on the jurisdiction of the Semarang Police, so generalization of the findings should be done with caution to other regions with different characteristics (Suteki & Taufani, Op.Cit.). For further research, it is recommended to conduct a longer, longitudinal study to analyze the long-term impact of ETLE implementation on changes in traffic culture. Comparative studies with other regions with different characteristics are also needed to validate the findings of this study. Furthermore, research on the psychological impact of ETLE on driver behavior could also provide a deeper understanding (Wibowo & Wahyuningsih, Op.Cit.).

4. Conclusion

Based on the research results and discussion outlined above, several conclusions can be drawn. First, the implementation of ETLE within the Semarang Police jurisdiction has been shown to increase public compliance with traffic laws. Data shows a downward trend in violations involving not wearing helmets from 45% (2022) to 40% (2024) and an increase in the fine payment rate from 67.5% to 77.5%. The ETLE system creates a psychological deterrent effect, increases transparency, and suppresses extortion through non-cash payments. This has resulted in a shift in the legal culture of the community, leading to greater compliance and supporting the modernization of law enforcement. Second, manual ticketing remains relevant due to its educational dimension through direct interaction between officers and violators. This interaction creates an immediate deterrent effect and provides contextual understanding of traffic regulations. Despite its weaknesses, including limited coverage, potential subjectivity, and

vulnerability to extortion, manual ticketing serves an important role as a complement to ETLE, particularly in areas not yet covered by cameras and for complex violations. The consistently high sanction settlement rate (82-86%) demonstrates the system's effectiveness and public trust. Third, the effectiveness of traffic law enforcement through ETLE and manual ticketing is influenced by various interrelated factors. These factors include: (a) clear regulations that are adaptive to technological developments; (b) the professionalism and competence of law enforcement; (c) the availability of adequate facilities and infrastructure; (d) the level of public legal awareness; (e) coordination between institutions (the National Police, Samsat, and the Transportation Agency); (f) easy access to fine payments; (g) outreach and education strategies; and (h) the financial and social sustainability of the system. In general, the combination of ETLE and manual ticketing creates a complementary hybrid system: ETLE excels in efficiency, consistency, and transparency, while manual ticketing excels in direct education and handling complex cases.

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