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Strategy of the Kotabaru District Transportation Department in Implementing Parking E-Levy as Part of the Smart City Program

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Abstract: The implementation of electronic parking retribution (e-retribution) represents a digital innovation supporting the realization of Smart Governance and Smart Mobility at the local government level. This study aims to analyze the strategy and effectiveness of e-retribution implementation in Kotabaru Regency as part of the Smart City program. The research employed a descriptive qualitative approach, collecting data through in-depth interviews, field observations, and document analysis, and analyzed using the Miles, Huberman, and Saldaña (2023) interactive model. The findings reveal that e-retribution contributes positively to transparency, efficiency, and accountability in local revenue management. However, its effectiveness remains limited due to unequal digital infrastructure, low technological literacy, and weak inter-agency coordination. These challenges indicate the need for adaptive strategies and digital ecosystem strengthening to expand program success. This study contributes both empirically and theoretically to the development of Smart Governance and Smart Mobility concepts, particularly in the context of archipelagic local governments.

Keywords: E-Retribution, Smart Governance, Smart Mobility, Public Service Digitalization, Local Government.

INTRODUCTION

The Smart City concept in Indonesia is developing as a national strategy to realize efficient, transparent, and digitally driven governance. The government is encouraging each region to integrate digital innovation into public services to improve bureaucratic effectiveness and accountability (Kominfo, 2022). Kotabaru Regency is one of the regions implementing an e-parking retribution system as a strategic step to improve service quality, optimise regional revenue, and create an orderly and accountable transportation system (Dishub Kotabaru, 2024).

However, the implementation of e-parking retribution in Kotabaru Regency has not been optimal. The main obstacles include low user compliance, limited technological infrastructure, low public digital literacy, and suboptimal coordination between stakeholders (Rahmawati & Hidayat, 2023). This has resulted in the program's objectives of increasing revenue, transparency in management, and ease of service not being fully achieved. Therefore, analyzing the factors influencing the effectiveness of e-retribution is crucial.

Implementing a digital system in parking management has the potential to reduce revenue leakage, improve transaction recording accuracy, simplify payment processes, and support data-driven decision-making (Sari & Nugroho, 2021). National research shows that digitizing public services can improve bureaucratic efficiency and transparency (Zein, Anggraini, & Arni, 2024), while a recent study emphasized that digital systems in the island transportation sector strengthen revenue transparency and public participation (Hidayat & Putra, 2025). Thus, e-parking retribution is not simply a technological innovation, but an instrument for strengthening regional governance within the framework of Smart Governance and Smart Mobility.

This study aims to analyze the effectiveness of e-parking retribution implementation, identify supporting and inhibiting factors, and formulate implementation strategies that enhance system transparency, accountability, and adaptability. Theoretically, this study enriches the literature on local government digital innovation by linking Smart Governance and Smart Mobility in an island context, a previously rarely studied area. Practically, the research findings are expected to provide strategic recommendations for the Kotabaru Transportation Agency (Dishub) to strengthen cross-actor collaboration, improve public digital literacy, and develop a responsive e-retribution system (Fahlevvi & Dytihana, 2024).

Previous studies have shown that e-retribution contributes to increased transparency and accountability of regional finances (Putri & Yuliana, 2022). However, most studies focus on urban areas with more advanced digital infrastructure, such as Bandung and Surabaya (Yuliani & Prakoso, 2020), leaving the context of island regions like Kotabaru Regency understudied. Unlike previous research, this study emphasizes the geographic conditions of islands, limited infrastructure, and community digital literacy as critical factors. It also presents a new conceptual framework integrating Smart Governance and Smart Mobility for evaluating digital policies in island regions, providing a more comprehensive theoretical and practical contribution than previous studies.

Therefore, this research is original and is expected to be a guide for the implementation strategy for e-parking fees that can be applied in similar island areas.

Literature Review

This section outlines the conceptual basis, previous research findings, and the conceptual model used to analyse the e-parking retribution implementation strategy in Kotabaru Regency. This study focuses on the integration of Smart Governance and Smart Mobility theories in the context of digitalising regional public services toward a Smart City.

Parking Fee Concept and Digitalization of Public Services

Parking fees are a crucial component of Pendapatan Asli Daerah (PAD), serving to support development and improve the quality of public services. However, the conventional system currently in use still faces several classic problems, such as revenue leakage, the presence of illegal parking, and weak oversight mechanisms (Putri, 2024).

Digitising public services is a solution to address these challenges. Information technology-based innovations enable cashless retribution payments, thereby increasing transparency and efficiency. According to Nugroho (2023), implementing a digital system in retribution management has the potential to reduce regional revenue leakage by up to 25% through increased accountability and data-driven oversight.

Furthermore, digital transformation in the public sector also strengthens the relationship between government and the public, particularly in terms of ease of access and transparency of information (Kurniawan & Dewi, 2023). In the context of parking management, electronic systems, or e-retribution, are not only payment instruments but also part of smart city governance to support sustainable urban mobility.

Therefore, it is important to review how the global concept of smart parking can be applied in different local contexts.

The Global Development of Smart Parking Systems

Globally, smart parking systems are rapidly evolving with advances in Internet of Things (IoT) technology, automated sensors, and big data, enabling real-time parking space detection and cashless payments (Biyik, 2021; Channamallu et al., 2024). These technologies offer significant opportunities to reduce revenue leakage and improve efficiency and user experience (Alsafar, 2024).

However, development orientation in developed countries tends to emphasise technological sophistication, while in developing countries, the challenges are more limited infrastructure and human resource capacity (Aswath et al., 2025). Therefore, technology adaptation needs to consider the local context to ensure implementation remains relevant and sustainable. Zhou and Chen (2025) emphasised that the success of smart parking in regional areas depends on the suitability of digital networks, operational costs, and local technical support.

Taking into account the geographic and social conditions of the community, smart parking management in island areas such as Kotabaru needs to implement an adaptive approach that balances technological innovation and institutional readiness.

Smart City: Dimensions of Smart Governance and Smart Mobility

The Smart City concept evolved in response to the complexities of modern urban governance. According to Albino, Berardi, and Dangelico (2022), a Smart City is defined as a city that utilizes information technology to improve the quality of life, efficiency of public services, and environmental sustainability. One of the main pillars of this concept is Smart Governance, which emphasizes transparency, accountability, and collaboration between government, citizens, and the private sector (Nam & Pardo, 2022).

Smart Governance dimensions encompass aspects of public data transparency (open government), citizen engagement, and efficient decision-making (Zahro & Aulia, 2024). Applying these principles in the context of e-parking retribution plays a crucial role in building public trust in local government digital systems.

Meanwhile, the Smart Mobility dimension highlights the importance of integrated transportation systems and efficient citizen movement in urban areas. A study by Borràs and Trullén (2024) emphasised that digitalizing transportation through smart parking systems can improve traffic management effectiveness, reduce parking search time, and lower carbon emissions.

Furthermore, research by Kim and Yoon (2025) in the *Journal of Urban Technology* shows that the success of smart mobility implementation depends on three factors: digital infrastructure readiness, inter-agency integration, and adaptive response to user needs. Thus, the synergy between Smart Governance and Smart Mobility provides a strong conceptual foundation for analyzing the implementation of e-parking retribution in regional areas.

Main Theories and Their Position as Analytical Tools

1. Smart Governance as Governance Analysis

Smart Governance theory is used to assess the extent to which the implementation of e-parking retribution reflects the principles of transparency, bureaucratic efficiency, public participation, and institutional coordination (Kaiser et al., 2024). The four main dimensions of the analysis include:

1. Income transparency (open data).
2. Public participation and parking actors.
3. Bureaucratic efficiency through digitalization of payments.
4. Cross-agency coordination (Dishub, Bapenda, and Bank Kalsel).

Using this theory, the study assesses whether the e-retribution policy actually strengthens accountable and inclusive digital governance.

2. Smart Mobility as a Mobility Impact Analysis

Smart Mobility theory is used to evaluate the impact of digital systems on the efficiency of movement and comfort of people. Its dimensions include:

1. Optimization of parking space.
2. Integration of transportation and traffic.
3. User experience (user experience).
4. Efficiency of urban movement (Wawer et al., 2022; Hollands, 2025).

This theory serves as an analytical tool to see the extent to which local government digital strategies contribute to mobility and the quality of public services.

Comparison and Synthesis of Previous Research

Previous research has shown varying results regarding the effectiveness of e-parking retribution implementation. Putri (2024) emphasized digitalization as a means of PAD, while Sarumaha (2025) highlighted barriers to digital literacy. Studies by the Bandung Research Center (2024) and the Makassar PAD Study Team (2024) highlighted the importance of institutional support and human resource training. Globally, Biyik (2021) and Channamallu et al. (2024) emphasized technological aspects, while Kaiser et al. (2024) and Anthopoulos (2024) highlighted participatory governance aspects.

This study synthesizes these findings by positioning institutional collaboration and community participation as key factors in the success of digitalizing regional public services.

Research Gaps and Study Justification

The literature review revealed three major gaps:

1. Geographical context, there is a lack of studies on digitalization in island regions such as Kotabaru.
2. Public participation, previous research has discussed more technical and fiscal aspects.
3. Regarding mobility impacts, there are still limited studies assessing the direct relationship between digital systems and traffic efficiency.

This study attempts to fill this gap by analyzing the implementation strategy of e-parking retribution within the framework of Smart Governance and Smart Mobility, as well as providing empirical and theoretical contributions to the literature on digitalization of regional government based on Smart City.

Conceptual Research Model

This research model uses an input–process–output–outcome approach to explain the relationship between regional readiness, implementation strategies, and digital policy outcomes (Wawer et al., 2022; Kaiser et al., 2024).

Table 1. Conceptual Framework

Component	Main Description
Input (Regional Readiness)	Regulation, HR, Infrastructure, Stakeholder Support
Implementation Process	Planning - Socialization - Implementation - Evaluation
Dimensions of Analysis	<ul style="list-style-type: none"> • <i>Smart Governance</i>: Transparency, Public Participation, Accountability. • <i>Smart Mobility</i>: Parking Efficiency, Transportation Integration, User Experience.
Output	Functioning of the e-parking retribution system, real-time transaction monitoring
Outcome	PAD transparency increases, public service efficiency increases, and support for Kotabaru Smart City increases.

Source: Data processed by researchers based on the results of a literature review (2025).

This model emphasises that the success of e-parking retribution depends not only on technological readiness but also on the extent to which the system strengthens participatory and data-driven governance.

Synthesis and Framework for Thought

Based on the literature review above, it can be concluded that the implementation of e-parking fees is not only related to regional revenue efficiency but also part of governance innovation towards a Smart City. The integration of Smart Governance and Smart Mobility provides a dual perspective: how the government manages transparency and public participation while simultaneously promoting the efficiency of the urban transportation system. Unlike the context of large cities in Indonesia and global studies that generally focus on infrastructure readiness and the integration of smart transportation systems, the implementation of e-fees in island regions faces challenges of digital literacy, network limitations, and more complex institutional capacity.

Conceptually, this research uses an input–process–output–outcome approach. Input components include regulatory readiness, human resources, and infrastructure support. Process stages include planning, outreach, implementation, and evaluation. Outputs include increased transparency and efficiency, and outcomes include increased public trust and local government accountability.

Through this framework, this study seeks to understand how the implementation of e-parking retribution supports the dimensions of Smart Governance and Smart Mobility in the context of an island region such as Kotabaru Regency. Based on this description, these two theoretical frameworks serve as the analytical basis for answering the research question regarding the effectiveness of e-parking retribution implementation in Kotabaru Regency. Building on this theoretical foundation, this study was then designed using a methodological approach that allows for in-depth exploration of the processes, actors, and context of policy implementation in the field.

METHOD

Types and Approaches of Research

This study uses a descriptive qualitative approach to gain a deeper understanding of the Dinas Perhubungan Kabupaten Kotabaru (Dishub) strategy for implementing e-parking fees as part of the Smart City program. This approach was chosen because the research focuses not only on policy outcomes but also on the implementation process, institutional dynamics, and social and technological factors influencing the program's effectiveness.

According to Creswell (2023), a qualitative approach allows researchers to explore the subjective meanings and experiences of public policy actors and to understand the policy context comprehensively. Meanwhile, Moleong (2021) emphasised that qualitative research emphasises the importance of in-depth interpretation of social phenomena through direct

interaction with participants and their contexts. A descriptive approach was chosen so that research results can describe phenomena systematically, factually, and accurately based on empirical data obtained through interviews, observations, and document analysis.

This research's theoretical approach draws on two main frameworks: Smart Governance and Smart Mobility, which serve as the analytical basis for assessing the extent to which the implementation of e-parking retribution supports transparency, accountability, and efficiency of urban mobility in Kotabaru Regency. This integrative approach has not been widely applied in digital policy research in the archipelago, offering a new perspective on regional digital governance practices. By combining these two frameworks through in-depth thematic analysis, this research is not only descriptive but also demonstrates methodological depth and analytical innovation that are empirically relevant for strengthening public policies based on service digitalization.

Location and Time of Research

This research was conducted in Kotabaru Regency, South Kalimantan Province, focusing on the Dinas Perhubungan (Dishub), the implementing agency for the e-parking retribution program. This location was purposively selected due to its unique characteristics as an archipelagic region with limited digital infrastructure, yet still demonstrating a strong commitment to implementing the Smart City concept at the regional level. These conditions make Kotabaru Regency a relevant case study for understanding the dynamics of digital policy implementation in a challenging geographic context.

The research will take place from September to October 2025, encompassing the entire series of activities, from data collection to the preparation of final results. In September, research activities focused on primary data collection through in-depth interviews and field observations. From late September to early October, initial data analysis and triangulation were conducted to ensure the consistency and validity of the findings. The final phase of the research will take place from mid-to-late October 2025, focusing on validating the results and developing policy recommendations based on the field findings.

Data Types and Sources

The data used consists of primary and secondary data. Primary data was obtained through in-depth interviews with key informants and field observations, while secondary data came from official documents, such as Regional Regulations, Transportation Agency performance reports, *Pendapatan Asli Daerah* (PAD) data, and academic publications related to e-parking fees and Smart City in Indonesia. The selection of these two types of data was intended to strengthen the validity of the results through source triangulation.

Data collection technique

Data collection in this study was conducted through three main techniques: in-depth interviews, field observations, and document analysis. In-depth interviews were conducted with key informants consisting of Transportation Agency officials, parking attendants, parking service users, and technology partners as system operators. The interviews were conducted in a semi-structured manner to provide informants with the freedom to express their experiences, views, and perceptions regarding the implementation of e-parking retribution in Kotabaru Regency.

Next, direct field observations were conducted in a strategic area, the Siring Laut tourist area, to gain a contextual understanding of the implementation of the e-parking retribution application. Through these observations, researchers observed interactions between officers and parking users, the digital transaction mechanisms involved, and various technical challenges encountered in the field.

To strengthen the reliability and validity of the findings, document analysis was also conducted on various official sources, such as digital transaction reports, *Pendapatan Asli Daerah* (PAD) data, and Standard Operating Procedures (SOP) for e-parking retribution. This document analysis served as a form of triangulation of sources and techniques, enhancing the credibility and objectivity of the research results.

Determination of Research Informants

The selection of informants was carried out using a purposive sampling technique, namely, determining informants based on direct involvement and relevance to the implementation of e-parking retribution.

Table 2. Informant Criteria and Number of Respondents

Informant Category	Amount	Criteria
Transportation Agency Official	3 people	Involved in planning, monitoring, and evaluation of e-parking fees.
Parking Attendant	5 people	Have used the e-retribution application for ≥ 6 months and been directly involved in the digital system trial.
Parking Users	10 people	People who have made digital payments ≥ 2 times via the e-retribution application.
Technology Partner / System Operator	2 persons	The technical party responsible for developing, and managing, application systems.

Source: Primary data processed by researchers (2025).

Determining the number of respondents refers to the saturation point principle, namely when the data obtained is considered saturated and no new relevant information is found (around 20 informants).

Data Analysis Techniques

Data analysis in this study was conducted interactively and thematically, referring to the model of Miles, Huberman, and Saldaña (2023). The analysis process took place continuously from the data collection stage to the conclusions, following three main interacting components.

The first stage is data reduction, which is the process of selecting, simplifying, and focusing data based on key themes related to the effectiveness, obstacles, and strategies for implementing e-parking retribution. The second stage is data presentation, which is carried out by compiling the findings in the form of a thematic matrix to map the relationship between the dimensions of Smart Governance and Smart Mobility in the context of regional digital policy implementation. The third stage involves drawing conclusions and verifying them, which is carried out through a cyclical interpretative process to ensure that the analysis results truly reflect the empirical reality on the ground. Through this approach, the data obtained can be systematically processed and produce a deep understanding of the dynamics of digital policy in Kotabaru Regency.

Data Validity Test (Validation and Reliability)

The data validity test in this study was conducted based on the four criteria proposed by Lincoln and Guba (2020): credibility, transferability, dependability, and confirmability. To strengthen the validity of the research results, an integrated triangulation of sources, techniques, and time was applied. Source triangulation was conducted by comparing information obtained from various informants, such as parking attendants, parking users, and Transportation Agency officials, with officially recorded digital transaction data. For example, the results of interviews with parking attendants were verified through Transportation Agency transaction records regarding the amount of daily fees.

Furthermore, technical triangulation was conducted by comparing interview findings with field observations regarding application usage at parking locations, as well as with daily reports from the Transportation Agency. Temporal triangulation was conducted through interviews conducted at two different periods, namely at the beginning and middle of the study (September–October 2025), to test data consistency and informants' perceptions of the e-parking retribution policy. Through the combination of these three forms of triangulation, this study is expected to have strong validity and reliability and be able to accurately and credibly represent empirical conditions in the field.

Research Instruments

This study used the researcher as the primary instrument (human instrument) involved in all stages of the study, from determining the focus to drawing conclusions. Supported by interview guides, field notes, and observation sheets, systematically designed to ensure data accuracy and consistency. The combination of these two instruments allows for the acquisition of relevant, credible, and contextual data, thus reflecting the empirical dynamics of digital policy implementation at the regional level.

Thematic Analysis Technique

This study uses thematic analysis, modeled after Braun and Clarke (2022), to identify and interpret patterns of meaning within informants' narratives, with the aim of exploring the social, institutional, and technological interrelationships in the implementation of e-parking retribution. This approach was chosen because it offers flexibility and interpretive depth compared to grounded theory or content analysis, and allows for direct integration with the Smart Governance and Smart Mobility frameworks to generate a reflective understanding of the dynamics of digital policy at the regional level.

Field Data Analysis Process

The field data analysis process was conducted interactively and continuously from the data collection stage to conclusion drawing, referring to the model of Miles, Huberman, and Saldaña (2023). The analysis encompassed three main stages: data reduction, data presentation, and conclusion drawing and verification, which were applied reflectively to maintain consistency between the empirical findings and the research conceptual framework.

Through this stage, researchers not only describe the phenomenon but also interpret the interaction patterns between actors, institutional dynamics, and the policy context that influence the effectiveness of e-parking retribution implementation. Thus, this analysis process provides a crucial foundation for a comprehensive understanding of the application of Smart Governance and Smart Mobility principles at the local level.

Thematic Mapping and Integration of Theoretical-Empirical Analysis

Thematic mapping was conducted to integrate field findings with the theoretical frameworks of Smart Governance and Smart Mobility, in order to build a comprehensive understanding of the implementation of e-parking fees in Kotabaru Regency. Referring to Braun and Clarke (2022), this process links empirical meaning patterns with theoretical constructs in a reflective and iterative manner, as suggested by Miles, Huberman, and Saldaña (2023).

The analysis reveals a close relationship between Smart Governance dimensions such as transparency, accountability, and public participation and Smart Mobility, which encompasses operational efficiency, system integration, and user convenience. Thus, thematic mapping serves not only as a categorization tool but also as a conceptual mechanism that bridges empirical data with digital policy theory, while strengthening the analytical foundation of research in formulating adaptive, inclusive, and sustainable implementation strategies.

Research Ethics

This research was conducted in accordance with ethical principles of social research, including participant consent, data confidentiality, and scientific integrity. All informants participated voluntarily by signing an informed consent form after receiving an explanation of the research objectives and procedures. The informants' identities were kept anonymous, and they had the right to withdraw at any time without consequence. The entire research process was conducted transparently and without manipulation to ensure academic honesty. By applying these ethical principles, the research is expected to produce valid, credible findings that reflect scientific responsibility at every stage of its implementation.

Reflective Cover

The methodological design used provides a strong foundation for an in-depth analysis of the dynamics of e-parking retribution implementation in Kotabaru Regency within the framework of Smart Governance and Smart Mobility. Through systematic and reflective analysis, this study is able to link empirical findings with the context of regional digital policy.

Next, the results and discussion section will describe the implementation of e-parking retribution based on field data, with a focus on aspects of transparency, accountability, efficiency, and public participation, including the identification of supporting and inhibiting factors for its success.

RESULTS AND DISCUSSION

Overview of e-Parking Retribution Implementation in Kotabaru Regency

The implementation of e-parking fees in Kotabaru Regency is part of the Smart City initiative that the Transportation Agency has been piloting since early 2024. Its main objective is to increase transparency, efficiency, and accountability in the management of *Pendapatan Asli Daerah* (PAD) through a QRIS-based digital payment system.

Observations show that the e-parking retribution system has only been implemented in one strategic location, the Siring Laut Kotabaru tourist area, while other parking points in the district capital and several sub-districts still use a cash system. Of the total 40 official parking points, only one (2.5%) will be fully integrated with the digital system by mid-2025. This percentage is relatively low compared to the pilot project target in large cities (30–50% of parking points are digitally integrated) (Ministry of Home Affairs, 2023). The main obstacles include limited digital payment facilities, unequal internet access, low digital literacy among parking attendants, and limited public outreach.

Thematic Coding Results

Interview and observation data were coded thematically using the Miles, Huberman, & Saldaña (2023) model, resulting in four main themes: system effectiveness, implementation barriers, social acceptance, and institutional adaptive strategies.

Table 3. Thematic Coding Results of e-Parking Retribution Research in Kotabaru Regency

Main Theme	Coding Sub Themes / Categories	Example of Informant Quotes	Meaning of Findings / Interpretation
System Effectiveness	Improved accuracy of transaction data recording	"Now all transactions are recorded automatically in the app, so there's no discrepancy between deposits and server data, and they can be monitored directly every day." (Informant 1 - Transportation Agency Official)	Digitalization increases financial transparency (minimizes leakage) and the accuracy of PAD data reports.

	Payment processing speed	"If you use QRIS, you don't need change, so the queue is faster." (Informant 9 - Parking User)	The e-retribution system speeds up transaction times and increases service efficiency.
Implementation Barriers	Internet network disruption	"If the network is slow, the application often fails to input, so we record it manually first." (Informant 4 - Parking Attendant)	Limited digital infrastructure and weak networks hamper the performance of digital systems.
	Lack of technical training	"Not all officers can use the application, sometimes we learn by doing." (Informant 5 - Parking Attendant)	Low digital literacy impacts the effectiveness of implementation.
Social Acceptance and Adaptation	Public resistance to digital payments	"Many residents still prefer to pay in cash because they don't understand how to use the app, and there are still residents who are afraid of scanning the wrong QR code so they ask to pay in cash." (Informant 10 - Parking User)	The level of digital literacy in society is still low, affecting the level of acceptance of digital innovation.
	Changes in young user behavior	"Young people get used to it quickly, and they even enjoy using QRIS." (Informant 6 - Parking Attendant)	The younger age group is a catalyst for changes in digital payment behavior.
Adaptive and Collaborative Strategies	Training and mentoring of officers (parking attendants)	"We conduct regular training and coordination to ensure data entry is correct and parking attendants can help educate users." (Informant 2 - Transportation Agency Official)	Institutional support is an important factor and strengthening human resource capacity is an adaptive strategy to increase program sustainability.
	Collaboration between agencies	"Data integration with Bapenda and Bank Kalsel is still in the trial stage." (Informant 19 - Technology Partner)	Collaboration between institutions is needed to expand system integration and PAD supervision.

Source: Interview data and field observations, processed by researchers (2025).

The above findings indicate that digitalization has improved financial transparency and *Pendapatan Asli Daerah* (PAD) reports, while also accelerating transaction times. However, limited infrastructure and digital literacy remain major obstacles. Institutional support and inter-agency collaboration are crucial for maintaining the program's sustainability.

Comparison Before and After Implementation of e-Parking Retribution

Analysis of the Transportation Agency's financial data shows an increase in PAD revenue from the parking levy sector after the implementation of the digital system, although the scale is still limited to one location.

Table 4. Comparison of Realization of Parking Retribution Revenue Before and After e-Parking Retribution

Year	Management System	Total Fee (Rp)	Change (Rp)	Percentage
2023	Manual (Cash)	759,510,000	-	-
2024	Digital (e-Retribution)	777,620,500	+18,110,500	+2.38%

Source: Data processed by researchers (2025).

The increase of Rp18,110,500 (2.38%) demonstrates increased effectiveness in recording and monitoring fees. However, compared to larger cities that have implemented digitalization at more than 30% of parking locations, this achievement remains relatively small (Putri & Yuliana, 2022; Zahara, Arwanda, & Naba, 2025). This underscores the need to accelerate digital infrastructure and public education in island regions.

Impact on Community Mobility Efficiency

In the Siring Laut area, parking transaction times have decreased by around 25–30% compared to manual systems because digital payments eliminate the need for change and speed up the administrative process. The digital system also helps the Transportation Agency monitor daily parking volumes and regulate officer rotations in high-traffic areas.

Despite visible positive results, efficiency is not evenly distributed. Some areas with limited internet connections still require offline data input and subsequent synchronisation. This situation confirms that mobility efficiency has significantly improved in areas with good digital infrastructure, but remains limited in areas with low connectivity. This finding aligns with Albino et al. (2022) and Hidayat & Putra (2025) that the effectiveness of technological innovation is highly dependent on infrastructure readiness and the community's social adaptability.

Results of Interviews and Field Observations

Primary data was obtained through interviews with 20 informants, including Transportation Agency officials, parking attendants, parking users, and technology partners. The main findings are summarised as follows:

1. Transportation Agency Official
Stating that the e-retribution system helps monitor daily payments, "Now the data goes directly to the dashboard and can be monitored in real time," said one Division Head.
2. Parking Attendants (5 people)
While the app makes recording easier, signal issues and limited technical training remain major obstacles. "If the network is good, the system runs smoothly. If the signal is lost, data sometimes has to be re-entered."
3. Parking Users (10 people)
Considering the digital system to be more practical, even though people over 40 years old are still reluctant to use QRIS because they are not yet familiar with digital wallets.
4. Technology Partners
He stated that the server and backend system are stable, but inter-agency coordination and network support need to be strengthened to expand the integration of the PAD system.

Analysis Based on Smart Governance Dimensions

The Smart Governance dimension emphasizes transparent, participatory, and data-driven governance. Field findings can be summarized as follows:

Table 5. Analysis Based on Smart Governance Dimensions

Aspect	Field Findings	Theoretical Analysis
Transparency & Accountability	Every transaction is recorded automatically, PAD leakage decreases.	Supporting Nam & Pardo (2021) and Fahlevvi & Dytihana (2024): digital accountability is a key indicator of Smart Governance.
Public Participation & Literacy	Participation is high in tourist areas, but low in public road areas.	Digital inclusion policies are needed to get people more involved.
Inter-Agency Collaboration	Coordination between the Transportation Agency, Bapenda, and Bank Kalsel is still limited.	A cross-sector data governance framework is needed for effective PAD integration.

Source: Data processed by researchers (2025).

Overall, the implementation of *e-retribution* has strengthened fiscal transparency and public accountability. However, institutional coordination across agencies remains a barrier to achieving fully integrated governance.

Analysis Based on Smart Mobility Dimensions

The Smart Mobility dimension focuses on improving mobility efficiency and simplifying parking transactions for the public. The following is a summary of field findings:

Table 6. Analysis Based on Smart Mobility Dimensions

Aspect	Field Findings	Analysis
Parking System Efficiency	Transaction time is reduced by 25–30% in the Siring Laut area.	Demonstrates increased efficiency and public service.
Technology Integration	Only 2.5% of parking points are digitally integrated.	Expansion of QRIS networks and devices is still very much needed.
User Behavior Changes	The younger generation adapts quickly, while the older age group is still cash-based.	Emphasizing that social transformation is the key to the success of Smart Mobility (Albino et al., 2022).

Source: Data processed by researchers (2025).

The study results show that mobility efficiency has increased at the pilot sites, but implementation remains very limited. This finding aligns with the concept that social transformation and technological readiness are key factors in the success of Smart Mobility.

Integration of Findings with the Theoretical Framework

The integration of research results with Smart Governance and Smart Mobility theories can be seen in the following table:

Table 7. Integration of Findings with the Theoretical Framework

Dimensions of Theory	Empirical Conditions	Strategic Implications
Smart Governance	Transparency has increased, PAD has increased by 2.38%, but institutional capacity remains limited.	It is necessary to improve digital literacy of civil servants and integrate data across agencies.
Smart Mobility	Transaction efficiency increased by ±30%, but only covers 1 point (2.5%).	Expansion of digital infrastructure and public education are priorities.

Source: Data processed by researchers (2025).

Success of e-implementation-*retribution* relies on the synergy between digital infrastructure, public literacy, and institutional collaboration. These three elements form the foundation for strengthening Smart Governance and Smart Mobility in island regions.

Discussion: Theoretical and Practical Implications

1. Theoretical Implications

This research strengthens the theories of Smart Governance and Smart Mobility by emphasizing that the success of digital innovation depends not only on technology but also on institutional readiness and the social context. The case of Kotabaru Regency demonstrates the importance of adaptive strategies to address infrastructure limitations and community literacy (Sari & Nugroho, 2021; Hidayat & Putra, 2025).

Digital literacy, infrastructure availability, and institutional collaboration are three key interrelated pillars supporting the successful implementation of e-parking retribution. This synergistic interaction between human factors, technology, and institutional governance emphasises that the effectiveness of Smart Governance and Smart Mobility cannot be achieved in isolation. Their success depends on the harmonious integration of digital innovation and institutional social capacity to create adaptive and sustainable public governance.

2. Practical Implications

Strategic recommendations to strengthen the implementation of e-parking retribution in Kotabaru Regency include: digital literacy training for parking attendants and the public, expansion of internet networks at strategic parking points, regulations for integrating e-retribution data with the PAD database (Zahara et al., 2025), and the formation of a cross-agency task force to strengthen data governance, coordination between stakeholders, and program sustainability.

The implementation of e-retribution has yielded positive results, including a 2.38% increase in *Pendapatan Asli Daerah* (PAD), a 30% acceleration in transactions, and improved financial transparency. Although coverage remains limited (2.5% of parking spots), these findings provide an original contribution to understanding the implementation of Smart Governance and Smart Mobility in an archipelagic context, while also serving as a guide for other regions with similar characteristics (Algifary & Irawati, 2025; Rianto, 2025).

Empirical reflections show that the effectiveness of e-retribution is heavily influenced by human capacity and institutional coordination. Barriers to digital literacy and limited infrastructure demand a contextually adaptive approach, ensuring that Smart Governance and Smart Mobility theories are not merely normative but also tested and adapted to the empirical conditions of archipelagic regions. These findings reinforce the view that public innovation requires a systemic perspective, where technology, human resources, and institutional governance interact dynamically.

Overall, this study confirms that the effectiveness of e-parking retribution in island regions is highly dependent on the readiness of digital infrastructure and institutional collaboration. This study's original contribution lies in integrating the concepts of Smart Governance and Smart Mobility in the context of under-researched island regions, and in providing strategic direction for strengthening digitalisation policies *Pendapatan Asli Daerah* (PAD).

CONCLUSION

This study aims to analyze the strategy and effectiveness of e-parking retribution implementation in Kotabaru Regency as part of the Smart City initiative. Based on qualitative analysis results obtained through interviews, observations, and documentation, it was found that the implementation of this system shows a positive direction towards smarter parking management. This innovation contributes to increased revenue transparency, service efficiency, and accountability in regional revenue management, while strengthening the implementation of Smart Governance and Smart Mobility dimensions at the local level.

Despite positive results, the effectiveness of implementation remains hampered by various obstacles, such as limited digital infrastructure, low technological literacy among parking attendants and the public, and weak cross-agency coordination. These obstacles demonstrate that strengthening regional digital ecosystems is a crucial prerequisite for ensuring the sustainability and equitable distribution of benefits from the digitalization of fees policy.

From a practical perspective, the results of this study provide recommendations for local governments to formulate more inclusive, adaptive, and sustainable public service digitalization policies. This effort can be achieved through increasing human resource capacity, expanding information technology infrastructure, and strengthening collaboration between stakeholders, including government, the private sector, and the community.

Theoretically, this research enriches the literature on the linkages between digital innovation, governance, and smart mobility in the context of island regions. Furthermore, this research provides an original contribution to broadening the understanding of digital transformation in *Pendapatan Asli Daerah* (PAD) governance and serves as a basis for developing effective e-retribution management policies in regions with similar geographic characteristics.

Table 8. Summary of Policy Recommendations for Strengthening the Implementation of e-Parking Retribution in Kotabaru Regency

No	Strategic Fields	Main Problems	Practical Policy Recommendations	Expected Output
1	Digital Infrastructure	Limited internet network and digital payment devices (QRIS) at most parking points.	Expansion of the internet network through collaboration with telecommunications service providers and the provision of digital devices at every strategic parking point.	E-retribution coverage has increased; system connectivity is more stable.
2	Human Resources (HR) Capacity	Low digital literacy of parking attendants and Transportation Agency officials.	Regular technical training, field mentoring, and digital literacy certification for field officers.	Human resource competency increases; input errors and technical constraints decrease.
3	Literacy and Community Acceptance	Older people are still reluctant to use digital payments.	Public outreach based on digital education and provision of QRIS usage guides in parking areas.	Digital system adoption rates are increasing across all age groups.
4	Inter-agency Collaboration	Coordination between the Transportation Agency–Bapenda–Bank Kassel is still limited.	Formation of a cross-agency task force for PAD data integration and real-time transaction monitoring.	Fiscal governance is more transparent and accountable.
5	Program Regulation and Sustainability	There are no derivative regulations that guarantee the consistency of the digitalization program for levies.	Preparation of Regent/Regional Regulations related to the digitalization of public services based on Smart Governance.	The sustainability of the e-parking retribution program is guaranteed through a strong legal basis.

Source: Data from field research and researcher analysis (2025).

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