International Journal of Applied and Scientific Research (IJASR)
Vol. 4 No. 6, 2026: 313-324

Public Service Innovation through Electronic Parking Systems in Urban Areas

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A R T I C L E I N F O

Keywords: Public Service Innovation, Electronic Parking, E-Parking, Digitalization, Urban Areas

Received : 27, April
Revised : 28, May
Accepted: 30, June

A B S T R A C T

This article examines electronic parking systems as a form of public service innovation in urban areas. Conventional parking services often face problems such as unclear tariffs, manual transactions, weak supervision, illegal parking practices, and limited accountability. Using a descriptive qualitative approach through literature review and document analysis, this study explores how e-parking contributes to improving public service quality. The findings show that electronic parking supports non-cash payment, digital transaction recording, data-based supervision, transparency of parking fees, and stronger local government accountability. However, its implementation still faces challenges, including limited digital literacy, infrastructure constraints, parking attendants' readiness, resistance to change, and weak inter-agency data integration. This article concludes that e-parking can improve public services when implemented as part of broader governance reform, not merely as a technological project.

DOI: https://doi.org/10.59890/ijasr.v4i6.248
E-ISSN: 3025-7670
https://nvlmultitechpublisher.my.id/index.php/ijasr/ind

INTRODUCTION

The expansion of urban areas has significantly increased community mobility, vehicle density, and the demand for well-managed parking spaces. In a modern city, parking can no longer be understood merely as the activity of placing vehicles in a certain space. It is part of public service delivery, urban transportation governance, spatial control, and local revenue management. When parking services are not properly organized, the impacts are visible in traffic congestion, illegal parking, conflicts between users and parking attendants, tariff uncertainty, and leakage of local government revenue.

Parking services are directly related to the obligation of government to provide orderly, certain, fair, and accessible services to the public. Law Number 25 of 2009 concerning Public Services defines public service as an activity or series of activities carried out to fulfill service needs for citizens and residents in accordance with laws and regulations. On this basis, parking services managed or regulated by local governments can be positioned as public services because they involve the provision of services to citizens, the determination of tariffs, field supervision, and the accountability of service providers.

One of the main problems in urban parking management is the continued dominance of manual systems. Manual parking services commonly rely on paper tickets, cash payments, non-real-time records, and field reports submitted by officers. Such a system creates difficulties in verifying the consistency between the number of vehicles served, the number of levies collected, and the amount deposited into the local treasury. Users also often encounter unclear tariffs, lack of official payment evidence, limited access to service information, and uncertainty regarding the availability of parking spaces.

In response to these problems, electronic parking systems have emerged as an innovation in public service delivery. Electronic parking, or e-parking, refers to the use of digital technology in the management of parking services, including payment, recording, monitoring, reporting, and control of parking revenue. Its forms vary, ranging from electronic parking terminals, non-cash payments using cards or QR-based systems, parking applications, occupancy sensors, surveillance cameras, and digital dashboards for monitoring local revenue.

This innovation is consistent with the broader agenda of digital government transformation. Presidential Regulation Number 95 of 2018 concerning Electronic-Based Government Systems emphasizes the use of information and communication technology to increase the integration, effectiveness, and efficiency of government administration. In the context of public services, digital transformation is expected to produce services that are faster, more transparent, more integrated, and easier for citizens to access.

This article discusses how electronic parking systems can be understood as public service innovation in urban areas. The analysis focuses on the relationship between parking service digitalization, service quality, transparency of parking levies, accountability of local governments, and implementation challenges. Through a qualitative literature-based approach, this article is

expected to provide conceptual and practical insights into the role of e-parking in local public service reform.

LITERATURE REVIEW

Public service is a central concept in public administration because it represents the concrete interaction between the state and citizens. Public service is not only measured by the existence of a service, but also by its quality, accessibility, fairness, certainty, and responsiveness to public needs. A good public service is characterized by clear procedures, predictable service time, transparent costs, competent personnel, accessible information, and effective complaint mechanisms.

In the context of parking, public service includes several dimensions. First, local governments provide, regulate, or supervise parking spaces. Second, they determine tariffs and payment mechanisms. Third, they guarantee order and safety in the use of parking areas. Fourth, they are responsible for managing revenue derived from parking services. Therefore, weaknesses in parking management should not be viewed merely as technical problems, but as indications of broader challenges in public service governance.

Service quality can be analyzed through dimensions such as reliability, responsiveness, assurance, empathy, and tangible evidence. In parking services, reliability can be observed in the certainty of tariffs and the availability of valid transaction records. Responsiveness is reflected in the ability of attendants or systems to serve users quickly. Assurance relates to the sense of security experienced by users in relation to their vehicles and transactions. Empathy concerns the ease with which different groups of users can access the service. Tangible evidence includes road markings, electronic devices, tariff information boards, service counters, and supporting facilities.

Public service innovation refers to the effort to renew the way government provides services to citizens. Innovation does not always mean creating something entirely new. It may also take the form of improving procedures, work processes, delivery channels, institutional arrangements, or service mechanisms so that services become more effective and responsive. In the public sector, innovation is important because citizens increasingly demand services that are fast, simple, affordable, transparent, and accountable.

Electronic parking is a type of process innovation and technological innovation. It changes parking services from manual transactions to digital transactions. This shift does not merely affect the payment instrument. It also changes the relationship among local government, parking attendants, service users, and supervisory systems. Through e-parking, transactions can be recorded, revenue can be monitored, service performance can be evaluated, and the potential for informal practices can be reduced.

An electronic parking system refers to a parking management mechanism that uses digital devices and information systems. Common components include electronic parking terminals, mobile applications, non-cash payment instruments, QR-based payment systems, parking sensors, surveillance cameras, and data dashboards. In smart parking studies, digital technology enables users

to obtain information on parking availability, pay without cash, and in some cases reserve spaces in advance. For governments, such technology supports data-based management of urban mobility.

Several Indonesian cities have introduced e-parking in different forms. Studies on electronic parking terminals in Makassar describe the system as an effort to modernize public services and increase local revenue. Research on e-parking in Medan also relates the system to smart city development and to the improvement of complex urban parking management. Similarly, studies on electronic parking policy in Surabaya place e-parking within the framework of e-government and smart city implementation.

The concept of e-government is relevant to electronic parking because it emphasizes the use of information technology in government administration and public service delivery. In Indonesia, e-government is formally developed through the Electronic-Based Government System. This framework does not only concern the development of applications, but also requires integrated business processes, data management, infrastructure, information security, and institutional governance. Therefore, the success of e-parking should not be measured solely by the existence of digital equipment, but also by how well the system is integrated with public service standards and local government accountability.

METHODOLOGY

This article uses a descriptive qualitative approach with a literature review and document analysis method. The qualitative approach was selected because the study seeks to understand the meaning, process, and governance dynamics of electronic parking systems as a public service innovation, rather than to test statistical relationships among variables.

The data sources consist of primary and secondary materials. Primary sources include regulations relevant to public service, electronic-based government, and local financial governance. The main documents examined are Law Number 25 of 2009 concerning Public Services, Presidential Regulation Number 95 of 2018 concerning Electronic-Based Government Systems, and Law Number 1 of 2022 concerning Financial Relations between the Central Government and Local Governments. These legal documents provide the normative foundation for understanding public service obligations, digital government transformation, and the relevance of parking levies as part of local revenue management.

Secondary sources consist of academic articles, policy reports, and previous studies discussing e-parking, public service innovation, smart city development, and digital public service delivery. These materials were selected because they provide empirical and conceptual insights into the implementation of electronic parking systems in Indonesian urban contexts.

Data were analyzed using thematic content analysis. The analysis began by collecting and reading relevant documents, identifying important concepts, categorizing recurring issues, interpreting the relationship among themes, and drawing conclusions. The main themes used in this article include electronic parking as public service innovation, contribution to service quality, contribution

to transparency and accountability, implementation challenges, and strategies for strengthening e-parking governance in urban areas.

RESULT AND DISCUSSION

The review indicates that the electronic parking system is a process innovation in public service delivery. It changes the operational pattern of parking services from manual procedures to digital procedures. In a manual system, users pay directly to parking attendants, and the record of revenue depends heavily on field reports. In an electronic system, payments are processed through digital devices, transactions are automatically recorded, and data can be monitored by the service manager.

This change improves the service chain because payment procedures become more standardized. Users obtain clearer tariff information and more credible transaction evidence, while local governments gain more accurate data regarding the number of transactions and the amount of revenue collected. Therefore, electronic parking is not only a payment instrument, but also a mechanism of service control and administrative accountability.

Another important finding is the contribution of e-parking to transparency. Under manual parking arrangements, it is difficult to verify whether the number of vehicles served is consistent with the levy deposited into government accounts. Electronic systems reduce this problem because every transaction can be recorded in a database. Transparency is important for local governments because parking levies are related to local revenue. It is also important for citizens because service users have the right to know official tariffs, payment mechanisms, and proof of payment.

The system also strengthens local government accountability. Accountability means that government must be able to explain, prove, and justify both the process and the results of service management. With digital data, local governments can monitor parking locations, transaction volume, operating hours, revenue potential, and the performance of attendants or third-party operators. Accountability in this context is not limited to financial reporting; it also includes the ability to evaluate service quality and improve urban mobility policy based on data.

From the perspective of service users, electronic parking provides convenience, tariff certainty, and reduced dependence on cash transactions. In urban communities where digital payment habits are increasing, non-cash parking payment can improve user experience. The system may also reduce unauthorized tariff collection because the amount paid follows the official tariff displayed and recorded in the system.

However, these benefits are not automatically experienced by all users. Some citizens, especially those who are not familiar with digital payments, may face difficulties. Therefore, the implementation of e-parking must be supported by public education, inclusive payment options, and assistance from trained officers in the field. Innovation should not create new barriers for citizens who have limited access to digital technology.

The analysis also finds several challenges in the implementation of electronic parking. First, digital literacy among citizens remains uneven. Not all users understand how to use non-cash payment instruments, mobile applications, or QR-based systems. Second, the readiness of parking attendants is crucial. Attendants who are used to cash-based systems need training so they can operate devices and follow digital procedures. Third, technological infrastructure must be reliable. Electronic parking requires functioning devices, internet connectivity, electricity, data security, and technical support. Fourth, resistance to change may arise from actors who benefit from informal practices within manual systems. Fifth, data integration among institutions is still limited in many local governments. Parking systems are often not fully connected to local financial systems, transportation databases, or public complaint channels.

The findings show that electronic parking innovation cannot be understood merely as the use of digital devices. It must be viewed as a broader transformation of public service governance. In parking services, this transformation includes payment procedures, transaction records, personnel supervision, levy management, complaint handling, and user experience.

First, e-parking reflects a shift from attendant-centered service delivery to system-supported service delivery. In a manual system, service quality depends heavily on the behavior of parking attendants. If an attendant does not provide a ticket, charges an unofficial tariff, or fails to deposit the full amount of revenue, the government may have difficulty supervising the process. In an electronic system, part of the control function is transferred to the digital system. Every transaction can be recorded, verified, and analyzed.

Second, e-parking strengthens the principle of transparency in public services. Transparency is reflected in the availability of tariff information, transaction records, and digital reports. This is important because unclear fees are among the most common public complaints in parking services. When the tariff is uncertain, citizens can easily feel disadvantaged. Conversely, when the tariff is displayed and payment is recorded, the relationship between users, attendants, and local government becomes clearer.

Third, electronic parking has the potential to strengthen public trust in local government. Trust grows when citizens perceive that services are managed in an orderly, fair, and accountable manner. In parking services, trust may emerge when users receive tariff certainty, experience more orderly parking arrangements, encounter fewer informal charges, and see that payments are directed into official systems.

Fourth, e-parking supports smart city policy. In a smart city framework, urban management is expected to rely on data, technology, and citizen-oriented services. Parking is a strategic component of urban mobility because it affects traffic flow, land use, and accessibility to economic areas. Parking data can help governments understand vehicle movement patterns, identify congested areas, assess parking demand, and evaluate transportation policies. For this reason, e-parking should not stand alone. It should be connected to transportation planning, spatial management, and urban information systems.

Fifth, the success of electronic parking is strongly influenced by social readiness. Good technology will not be effective if citizens do not understand how to use it. Advanced equipment will not be useful if officers are not trained, systems are not maintained, and supervision is weak. Implementation should therefore be participatory. Local governments need to involve parking attendants, service users, nearby business actors, technology providers, and supervisory institutions.

Sixth, electronic parking must consider service equity. Not every citizen has equal access to digital devices, electronic money, or mobile banking. If the service is forced to be fully cashless without an adequate transition mechanism, some users may be excluded from access. In the early stages, a hybrid model can be considered. This model provides digital payment options while still offering field assistance for users who are not yet familiar with digital transactions.

Seventh, local governments must ensure that digitalization does not merely transfer manual problems into digital systems. For example, if transaction data exist but are never audited, transparency has not been fully achieved. If an application exists but is difficult to use, service quality has not improved. If devices are installed but are not integrated with local financial reporting, accountability remains limited. Therefore, e-parking must be treated as an institutional reform, not only as a procurement of equipment.

From the perspective of public service innovation theory, e-parking contains an element of novelty because it changes the service mechanism. It also provides added value by improving efficiency, transparency, and accountability. However, for an innovation to be considered successful, it must deliver real benefits to citizens. These benefits can be observed in easier access, tariff certainty, reduced informal charges, better convenience, improved order, and stronger public trust.

CONCLUSIONS AND RECOMMENDATIONS

Electronic parking systems are a relevant form of public service innovation in urban areas. The innovation emerges from the need to improve manual parking services that often face problems of tariff uncertainty, weak transparency, revenue leakage, illegal parking, and limited supervision. Through electronic systems, parking services can become more orderly, better documented, and easier to monitor.

This article concludes that e-parking contributes to the improvement of public service quality in several ways. First, it provides tariff certainty and transaction evidence to users. Second, it strengthens transparency in parking levy collection. Third, it increases local government accountability through transaction data that can be monitored and evaluated. Fourth, it supports data-based urban transportation governance. Fifth, it can become part of smart city development when integrated with broader urban service systems.

Nevertheless, the success of electronic parking cannot be determined only by the availability of technology. Human resources, institutional arrangements, local regulations, infrastructure, information security, and organizational culture have equally important roles. Challenges such as digital literacy, the readiness of

parking attendants, resistance to change, unstable internet connections, system maintenance, and limited data integration must be addressed so that e-parking can truly provide benefits for citizens.

Several recommendations can be proposed. First, local governments need to establish clear technical regulations for electronic parking implementation, including tariffs, service locations, service standards, payment mechanisms, the authority of attendants, and revenue monitoring procedures.Second, public education should be conducted before and during implementation. Socialization must explain payment procedures, official tariffs, service benefits, and complaint channels. Third, parking attendants should be positioned as part of service transformation, not as actors left behind by digitalization. They need training in device operation, service ethics, and new work procedures. Fourth, technological infrastructure must be maintained continuously. Devices, applications, servers, internet networks, and data security systems must operate reliably so that public trust is not weakened. Fifth, electronic parking systems should be integrated with local financial systems, public complaint mechanisms, and urban transportation planning. Sixth, periodic evaluation should involve service users through satisfaction surveys, citizen forums, complaint channels, and transaction audits. Seventh, e-parking implementation must uphold inclusiveness by ensuring that citizens who are not familiar with digital payments can still access services through assistance or an adequate transition mechanism.

Ultimately, electronic parking should be understood as a reform of public service governance. Its main purpose is not only to increase parking revenue, but also to create services that are easier, more transparent, more accountable, fairer, and more responsive to the needs of urban citizens.

FURTHER STUDY

Future research on electronic parking systems should move beyond descriptive discussions of digitalization and examine more deeply how e-parking transforms public service governance in urban areas. Since the present study focuses on electronic parking as a form of public service innovation through literature review and document analysis, further studies may develop empirical field research involving local governments, parking attendants, service users, business actors, and technology providers. This would allow researchers to understand how electronic parking is implemented in real administrative settings and how different actors respond to the transformation from manual to digital parking services.

Advanced research may also explore the relationship between electronic parking systems and public trust. In urban public services, trust is built not only through the availability of technology, but also through service certainty, tariff transparency, data accountability, and fair access for all users. Therefore, future studies can investigate whether the implementation of e-parking actually improves citizens' trust in local governments. This can be examined through users' experiences, perceptions of service fairness, satisfaction with digital payment systems, and their views on the reduction of illegal parking practices or unofficial charges.

Another important direction is the study of institutional readiness. Electronic parking cannot be treated merely as a technological project because its success depends on regulations, human resources, infrastructure, supervision, and inter-agency coordination. Future research may analyze how local transportation agencies, financial management offices, parking management units, and digital payment providers coordinate in managing e-parking systems. This issue is important because weak institutional integration may cause digital parking systems to function only as payment tools without significantly improving transparency and accountability.

Further research can also apply a comparative approach between cities. Different urban areas may have different models of e-parking implementation, depending on population density, fiscal capacity, parking demand, digital infrastructure, and local government commitment. A comparative study between several cities would help identify best practices, implementation gaps, and policy models that are suitable for different urban contexts. Such research could provide stronger recommendations for local governments that plan to develop or improve electronic parking services.

In addition, future studies may combine qualitative and quantitative methods. Qualitative research can explain the implementation process, actor relations, and governance challenges, while quantitative research can measure user satisfaction, service efficiency, revenue improvement, and the level of public acceptance. A mixed-method approach would provide a more comprehensive understanding of how electronic parking contributes to public service quality and urban governance.

Overall, advanced research on electronic parking should focus not only on the use of digital devices, but also on broader issues of governance reform, public value, service equity, and sustainable urban management. By doing so, the study of e-parking can contribute not only to transportation management, but also to the development of more transparent, accountable, inclusive, and citizen-oriented public services.

ACKNOWLEDGMENT

The author would like to express sincere gratitude to the lecturers of the Public Service course in the Doctoral Program of Public Administration, Universitas Muhammadiyah Jakarta, namely Rahmat Salam and Taufiqurokhman, for their valuable guidance and academic direction in completing this paper. Hopefully, this paper can be beneficial to many parties.

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