# Evaluation of Electronic Parking Terminal Policies in the City of Bandung

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**Abstract.** Advances in parking management technology play a crucial role in improving urban mobility efficiency. Since 2017, the City of Bandung has implemented the Electronic Parking Terminal (TPE) program to increase parking revenue and address the inefficiencies of conventional parking systems. However, after several years of implementation, the outcomes remain below expectations. This study evaluates the performance of the TPE program, identifies key obstacles in its execution, and proposes improvement strategies. The research applies the CIPP (Context, Input, Process, Product) evaluation framework to provide a comprehensive assessment of the program's implementation. Using a qualitative approach through interviews and field observations, the study finds that the TPE program has not functioned optimally. From the *context* dimension, TPE deployment is still concentrated in urban centers, despite its potential to meet community and government needs for a digital parking system. The *input* aspect reveals limitations in infrastructure, budgeting, personnel, and training. From the *process* perspective, implementation is hindered by technical malfunctions and insufficient public socialization, while the *product* dimension shows that parking revenue has yet to meet targeted regional income levels. To enhance performance, the study recommends regular maintenance, expanded payment options, intensive socialization, periodic evaluation, subscription-based e-parking, and stronger supervision and law enforcement.

**Keywords:** Policy Evaluation, Electronic Parking Terminal

## 1 Introduction

Parking in major cities represents a significant and complex public challenge. The problem arises primarily from rapid population growth, which has led to an increase in the number of motorized vehicles. According to the Central Bureau of Statistics (BPS), the number of motorized vehicles in Indonesia continues to rise each year. In 2021, there were 141,992,573 registered vehicles, increasing to 148,261,817 units in 2022. This trend is also evident in West Java Province, which—according to BPS data in 2024—contributed 17,600,134 motorized vehicles, making it one of the largest contributors to Indonesia's total.

As the capital and largest city of West Java, Bandung significantly contributes to this growth. Data from the Bandung City Transportation Agency show that the number of vehicles currently reaches approximately 2.2 million units, consisting of around 1.7 million motorcycles and 500,000 cars. This condition highlights the major challenge faced by the city in managing vehicle mobility and parking—both on-street and off-street (Rajul, 2023).

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To address these challenges, the Bandung City Government has introduced various policies related to parking management. Initially, regulation began with the Mayor's Decree Number 551/Kep.648-DisHub/2017 concerning the Determination of Parking Locations on the Edge of Public Roads. Over time, policies evolved, starting from Regional Regulation Number 16 of 2012 to the most recent Bandung City Regional Regulation Number 3 of 2020, which governs payment mechanisms, parking rates, zoning, and fee criteria based on vehicle type and parking duration. These regulations aim to create transparent and equitable parking management that meets public needs while contributing to Bandung's Regional Original Revenue (PAD).

Despite the existence of these regulations, illegal parking remains rampant across Bandung. This condition not only reduces potential PAD but also disrupts organized parking management, road user convenience, and traffic safety. Illegal parking often narrows roadways, exacerbating congestion, and sidewalks intended for pedestrians are frequently misused as parking spaces, reducing pedestrian comfort. Moreover, illegal parking can lead to thuggery and threaten neighborhood safety—issues that persist in Bandung, even if not widely publicized (Hidayat et al., 2018).

According to Herdiana (2022), Bandung's potential parking revenue could reach between IDR 80 and 135 billion annually. However, due to illegal parking practices, much of this potential income fails to enter the city treasury. Instead, significant portions are diverted to unauthorized individuals or groups who benefit improperly from unregulated parking operations.

In response to these revenue losses and the ongoing issues of security, order, and public convenience, the Bandung City Government has taken strategic steps to resolve the problem—most notably by adopting the *smart parking* concept. This initiative aligns with the *Smart City Vision* outlined in the 2013–2018 Regional Medium-Term Development Plan (RPJMD) and serves as an essential strategy to address increasingly complex parking challenges amid rapid vehicle growth.

The implementation of the *smart parking* program, as part of the smart city framework, materialized through the introduction of the **Electronic Parking Terminal (TPE)** system. The TPE is an advanced parking technology designed to manage and monitor vehicle parking more efficiently through digital means. The machines, branded *Cale* from Sweden, were procured through the Regional Budget (APBD) at a cost of IDR 55,585,000,000 (Imaduddin, 2021). This system enables cashless transactions using electronic payment cards such as BRIZZI (BRI), E-Money (Mandiri), and TapCash (BNI), thereby reducing dependence on cash payments.

The adoption of TPE aligns with ongoing developments in information technology and changing public behavior in the digital era. It is expected to serve as an effective solution to the complex parking challenges faced by Bandung City. Since its initial implementation through 2023, the TPE program has demonstrated potential benefits for urban parking management, although its overall execution remains suboptimal and requires further evaluation and improvement.

Based on the information obtained, the current parking rates in Bandung City can be seen in the following table 1.

**Table 1.** Parking Rates in Bandung City

| **No** | **Vehicle Type** | Years | |
|---|---|---|---|
| | | **2021** | **2022-2023** |
| 1 | Semi-Trailer/Trailer/Container | The first hour : Rp. 6.000<br>Next hours : Rp. 6.000 | The first hour : Rp. 7.000<br>Next hours : Rp. 7.000 |

| | | | |
|---|---|---|---|
| 2 | Bus/Truck | The First Hour: Rp. 6.000<br>Next hours : Rp. 6.000 | The first hour : Rp. 7.000<br>Next hours : Rp. 7.000 |
| 3 | Box/ Pickup | The First Hour : Rp. 3.000<br>Next hours : Rp. 3.000 | The first hour : Rp. 5.000<br>Next hours : Rp. 5.000 |
| 4 | Car | The First Hour : Rp. 3.000<br>Next hours : Rp. 3.000 | The first hour : Rp. 5.000<br>Next hours : Rp. 5.000 |
| 5 | Motorcycle | The First Hour : Rp. 2.000<br>Next hours : Rp.2.000 | The first hour : Rp. 3.000<br>Next hours : Rp. 3.000 |

(Source: Bandung City Transportation Agency, 2024)

Based on the existing parking tariff, it is known that the performance of TPE implementation, in the context of contribution to local revenue from parking levy is not optimal. This can be seen from the achievement of parking retribution from the expected target, for example in 2023, the target of parking retribution is Rp.31,323,036,000 the realization is only Rp.11,104,582,601. The complete data for the 2021-2023 time period can be seen in table 1.2 below.

**Table 2.** Complete Data for the 2021-2023 Time Period

| Years | **Target** | **Realization** |
|---|---|---|
| 2021 | 24,738,480,000.00 | 6,015,740,754.00 |
| 2022 | 25,323,036,000.00 | 9,728,799,801.61 |
| 2023 | 31,323,036,000.00 | 11,104,582,601.00 |

(Source: Bandung City Transportation Agency, 2024)

From the data in Table 2, it can be said that the implementation of the TPE program has not been able to increase or optimally achieve the revenue target from parking fees in Bandung City. On the other hand, the reality in the field shows that not a few TPEs are experiencing sustainability problems. Of the 445 units initially inaugurated in 2017, currently only 293 units remain active, while 152 other units are inactive.

Based on the above background, it is necessary to conduct research with the main objectives being (1). analyzing and assessing the implementation of the TPE program with the CIPP theory (context, input, process and product); (2). knowing the factors that hinder the implementation of the TPE Program, and (3). providing suggestions for improvement to improve the implementation of the TPE Program in the future.

## 2 Methods

To answer the purpose of this research, a qualitative approach with a qualitative descriptive method was used. Data collection was carried out using in-depth interview techniques, documentation studies and observation. Data validation was carried out using technique and source triangulation.

The data analysis process was carried out using the theory of Miles and Huberman (1994) with steps including data collection, data reduction, interpretation and analysis and data presentation, and synthesizing or drawing conclusions. The data analysis process can be seen simply in the following figure.

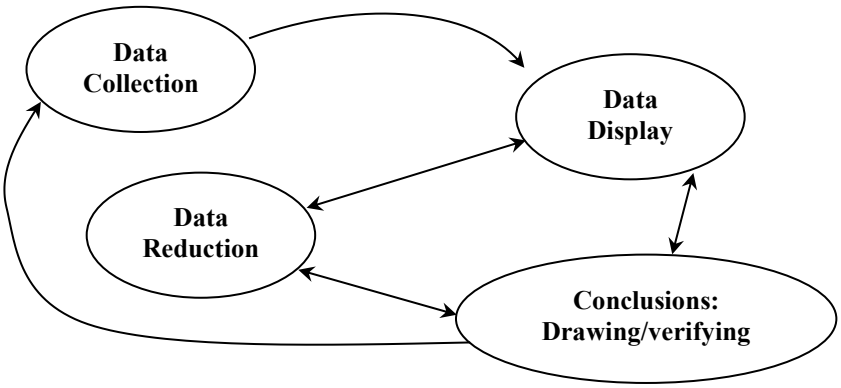


**Fig. 1.** Data Analysis Process
Source: Miles and Huberman; 1994

## 3 Result and Discusio

### 3.1 TPE Program Evaluation in the Perspective of CIPP Theory

The implementation of the TPE program in Bandung City which has been carried out for approximately 7 (seven) years since 2017, it is important to evaluate the implementation of the TPE program. Meanwhile, in conducting an evaluation or assessment of the implementation of the TPE program, the concept or theory of Stufflebeam (1960) is used, in which the assessment is not carried out only on the product or output of the TPE program implementation, but more comprehensively, which also concerns aspects of the context, input, and implementation.

In the context aspect, this research found that the TPE program is needed by the Government and the people of Bandung City in order to overcome the potential loss of parking levies and problems of security, order and comfort in parking management in Bandung City. So from the information obtained, it explains that the TPE program was designed and implemented based on a deep understanding and consideration of the needs and challenges that exist in the Bandung City government. There are three important and main issues related to parking in Bandung City, namely congestion, driver inconvenience in parking and loss of potential retribution income to the Bandung City government.

From the documentation study conducted on the academic paper and the implementation report of the TPE program, the same information was found regarding why the TPE program was issued in Bandung City. This at least explains that the process of identifying problems relevant to parking issues in Bandung City was carried out by the Transportation Agency. From the problem identification process, the Bandung City Transportation Agency innovated a technology-based program for parking payment transactions using a machine called the Electronic Parking Terminal (TPE) which essentially aims to increase local revenue in Bandung City, facilitate the distribution of parking revenue because payments use several e-money cards, and are expected to reduce illegal levies by parking officers and provide comfort for drivers in parking in parking areas in Bandung City.

It is unfortunate that the potential for lost retribution continues to occur. In fact, this source of revenue is very much needed in the effort to implement development in Bandung City. It is often found that illegal parking attendants carry out the parking process but the proceeds of the

levy do not go to the regional treasury, but to the benefit of certain individuals or groups. Likewise, people who use parking lots are not fully aware of making parking payments as they should. As a result, the potential for parking retribution is lost. Even though the potential for parking fees is quite significant in influencing the receipt of local revenue. This is because the number of owners of two- and four-wheeled motorized vehicles is very large in Bandung City. As the data obtained shows that the number of two-wheeled and four-wheeled motorized vehicles for 2023 amounted to 2.2 million of the total population of Bandung City which amounted to 2.4 million people. These vehicles consist of around 1.7 million motorcycles and 500 thousand cars. This condition shows that the opportunity to get a large retribution and contribute to the PAD of Bandung City is relatively significant. We take an example if the car tariff at TPE in Bandung City is 5 thousand per hour and 2-wheeled motorized vehicles are 3 thousand per hour, then from the number of existing cars of 500 thousand multiplied by 6 thousand, it has reached 3 billion every hour. Although not all parking, but if we assume that about 10% of the total vehicles use TPE facilities, then the potential income that can be obtained from car parking alone can reach around 150 million per hour. Thus, in one day, if TPE operates for 12 hours, the revenue from car parking can reach 1.8 billion. But in reality, for example, in 2023, parking retribution only reached 11 billion in a year. This shows that revenue realization from TPE is still far from the expected potential.

On the aspect of the suitability of the TPE program with the needs of the community and the effectiveness in obtaining retribution, the information obtained explains that the TPE program is not fully in accordance with the needs of the community. The incompatibility is because it is considered that the parking area for vehicles at locations where there is TPE is still not wide enough. Only in locations within the city, while in the suburban area there is no TPE. This condition is also exacerbated by the lack of socialization to the general public and especially to users regarding the use of TPE and also to parking attendants in the TPE parking area. Minimal socialization and lack of understanding of users then residents feel confused regarding its use.

These facts show that although the program is designed to improve parking efficiency, many users are still unaware of how the system works, resulting in less than optimal utilizationIn addition, the reach of the TPE program, which is still limited to parking areas within the city of Bandung, also has an impact on the effectiveness and efficiency of the utilization of TPE to increase PAD and reduce the number of illegal parking that eliminates the potential for revenue. Therefore, it is also necessary to expand the TPE area to peripheral areas, which in the context of Bandung City, these areas are also dense with vehicles but parking security and inconvenience always occur, both 4-wheeled and 2-wheeled vehicles.

This fact also explains that the TPE program needs to be developed to meet the needs of people in various locations in the suburbs, not just in the city center. Spreading the use of TPE to the periphery is believed to reach more users and provide easy access for people who live outside the city center as well as increase the potential for local revenue from parking fees.

The lost retribution potential is also caused by the ability of TPE system users. Most users of 2-wheeled vehicles do not have e-money cards, making it difficult to conduct electronic parking transactions, and even those who have them are not familiar with using them. As a result, the act of making payments to parking attendants, especially if they are illegal parking attendants, the possibility of not entering the local treasury is high. These limitations discourage motorcycle users from switching to electronic parking systems, which are supposed to provide convenience and efficiency. Therefore, it is important for the government and TPE managers to provide more diverse payment options, so that all users, including motorcyclists, can easily access this e-parking service. Thus, a better understanding of community conditions is essential

to design better and more effective programs in the future. Thus, in this aspect of context, the government's understanding of the contextual parking problems and the needs of the community is relatively well taken care of. What is lacking is that the TPE program is still unable to reach more widely to the parking areas in Bandung City which are located in the periphery. In fact, the potential to increase local revenue from parking fees is relatively large.

Seen from the input aspect, the assessment of the TPE Program can be explained from the indicators of resources and plans used to implement the TPE program. For the resource aspect based on the data and information obtained, it can be explained that the implementation of this TPE program there are several important resources needed and need to be examined objectively. In the budget indicator, the total budget used to implement the TPE program is Rp. 55,585,000,000.00. This budget is generally allocated for the procurement of equipment, provision of supporting facilities, and operational costs. The size of the budget for the TPE Program reflects the government's strong commitment to adopting modern technology for parking management. However, with many people returning to conventional payment methods, questions arise about the effectiveness of the use of these funds. Is the procurement of expensive equipment and supporting facilities really in line with user needs? Public dissatisfaction with the existing system suggests that this investment is not delivering the expected results. This is in line with the results of the Cost Benefit Ratio (CBR) and Return On Investment analysis of the TPE program budget for 7 (seven) years of operation, as follows.

**Table 3.** Operating Budget Data per 7 (seven) Years

| Year | **Total Budget Cost** | **Total Realization** |
|---|---|---|
| 2017 | 55.585.000.000 | 1.523.687.500 |
| 2018 | | 5.911.401.500 |
| 2019 | | 3.359.018.000 |
| 2020 | | 6.817.107.286 |
| 2021 | | 6.015.740.754 |
| 2022 | | 9.728.799.801 |
| 2023 | | 11.104.582.601 |
| **Total** | **55.585.000.000** | **44.460.337.442** |

(Source: Parking Technical Implementation Unit of the Bandung City Transportation Agency, 2024)

Table 3 if using Cost Benefit Ratio (CBR) and Return on Investment (ROI) analysis, is explained as follows.

**A.** Cost Benefit Ratio (CBR)

This analysis is used to compare the total costs incurred for a project or program with the total benefits resulting from the project. With this, it is formulated as follows.

$$CBR = \frac{\text{Total Benefits}}{\text{Total Cost}}$$

$$CBR = \frac{44.460.337.442}{55.585.000.000}$$

The value of CBR≈0.800 was obtained. This means that the CBR of the TPE program in Bandung City during the period 2017 to 2023 is 0.800. This indicates that for every rupiah invested in the TPE program, the benefits obtained are about 80 cents. A CBR of less than 1 indicates that the cost of the program is greater than the benefits generated, although it is close to 1. It can be interpreted that the TPE program is almost balanced in terms of costs and benefits.

**B.** Return On Invesment (ROI)

This analysis is used to evaluate the efficiency or profitability of an investment. In other words, ROI provides an overview of how much value is generated from each unit of cost invested, thus helping decision makers in assessing the success of a project or program. With this, it is formulated as follows.

$$ROI = \frac{\text{Total Benefits} - \text{Total Cost}}{\text{Total Cost}} \times 100$$

$$ROI = \frac{44.460.337.442 - 55.585.000.000}{55.585.000.000} \times 100$$

$$ROI = \frac{-11.124.662.558}{55.585.000.000}$$

$$ROI \approx -20.00\%$$

This means that the ROI of the TPE program in Bandung City during the period 2017 to 2023 is around -20.00%. This indicates that the investment in the TPE program is a loss, where the total benefits obtained are lower than the total costs incurred.

Overall, the CBR and ROI analysis of the TPE program in Bandung City shows that despite the potential to increase local revenue, the implementation of this program is far from optimal. In this case, the large budget could be considered a waste. The inability of the program to achieve its main objectives creates the impression that funds are being wasted, creating doubts about the government's ability to manage resources optimally.

When viewed from the facility resources and technology used, it can be explained that the operation of TPE technology is still not in accordance with the needs of the community. Especially after 7 (seven) years of operation until now it is still not optimal. How is it possible to expect this system to function optimally and can achieve program objectives, if many parking machines are not maintained or even not functioning? Currently, there are only 293 active TPE machines left from the initial total of 445 active machines. A number that reflects the lack of effective management and maintenance of a system that is supposed to be a solution to the parking problem in Bandung City. We need to question the government's commitment in maintaining this infrastructure. This situation will only exacerbate the public's dependence on illegal parking attendants, further complicating efforts to minimize the loss of potential parking fees and enforce an orderly and transparent parking system. This instability not only disrupts the payment process for users, but also creates confusion among the public. Many users complain that the parking machines are often unable to accept payments or experience technical glitches, which results in them having to find other alternatives to pay for parking, such as paying the parking attendant manually.

In addition to parking machines that often experience errors, service users also complain about a system that is not diverse. Moreover, users of 2-wheeled motor vehicles rarely have electronic cards. This condition reflects a significant challenge in the implementation of TPE in Bandung City, especially related to accessibility and ease of payment for motorcycle users. It is

ironic that in this digital era, a parking system that is supposed to make it easier actually creates obstacles for most users, especially motorcyclists who do not have the appropriate e-money on demand. For the use of this TPE, the e-money that can access are BRIZZI (BRI bank), E-Money (Mandiri bank), and Tap-Cash (BNI bank) payment cards.

The limitations in payment options show that the system has not fully adapted to the increasingly diverse needs of modern society. Therefore, if Bandung wants to build a smart city, especially in the context of parking management, then these shortcomings need to be improved in the future, for example by expanding payment methods and increasing socialization to the user community. Don't let this effort go in the opposite direction and return the public to using conventional parking payment methods.

According to information obtained from interviews with the Transportation Agency, TPE maintenance is carried out routinely. They stated that machine maintenance is done every day to ensure that all machines are functioning properly. However, the reality on the ground shows otherwise. If it is true that maintenance is carried out routinely, why are there still many parking machines that are not functioning and only 293 active units remain? This raises serious questions about the effectiveness and consistency in the implementation of such maintenance. The parking attendants revealed that even when the machines experience errors, the government's response to the problem is often unresponsive. Obviously, these data and information are at odds between the government and the experience on the ground.

From the data and information, the input aspect, namely human resources in the operationalization of TPE, is already available with a total of 40 sector heads who handle 1300 parking attendants. The 40 sector heads handle the parking sections and the existing parking attendants. With the number of parking attendants reaching more than 1,300 people, the ratio of officers to parking attendants is very unbalanced, namely one officer to supervise more than 16 parking attendants.Then, if there are currently 293 active TPE machines and the management has around 40 supervisors/sector heads, it can be calculated how many TPE points are supervised by each sector head by dividing the 293 TPE points by the number of sector heads of 40 people, then the number is 7.325. That means that each sector head supervises around 7 to 8 TPE points. Thus, each sector head has the responsibility to supervise several TPE points, which indicates a fairly heavy workload in the management and supervision of the electronic parking system in Bandung City. This shortage of personnel results in difficulties in effective rule enforcement and supervision, which can affect the overall performance of the program, particularly with regard to minimizing the loss of retribution potential.

In addition, the quality of sector heads and parking attendants in managing TPE machines is also a concern. Information obtained that damage to TPE machines is caused by the quality of employees in repairing the technology is minimal. If there is damage, the repair takes a long time because this electronic parking machine is made in Sweden which not many people can repair this machine. So the quantity and quality of the human resources aspect is still inadequate.

The personnel limitations are also caused by budget limitations, especially after the UPTD parking lot is institutionalized as a Regional Public Service Agency (BLUD). With the BLUD system, the funding received depends entirely on the revenue generated from parking services, without any allocation of funds from the Regional Budget (APBD). This makes the pressure to achieve retribution revenue targets important. Unfortunately, there are still many people who do not use a more modern payment system and choose to pay directly to the parking attendant.

The absence of a budget from the APBD means that any operational costs, including monitoring, staff training, and infrastructure repairs, must be covered by the revenue generated from the parking fees collected. If the revenue does not reach the target, then the budget for

important activities such as training for employees and maintenance of parking machines will be hampered, resulting in poorly maintained TPE machines.

In practice, it is not only the problem that was conveyed previously, related to this parking levy. The system of sharing the results from the levy collection is also not quite right. There is a difference in the distribution of levy collections from manual payment methods and electronic parking. If done manually to the parking attendant, the parking attendant gets 60% of the profit and deposits 40% to the head of the sector. If done by TPE machine, then all payments will go directly to the regional treasury, then distributed according to the set target. The profit sharing between parking attendants and retribution should be the same as electronic parking payments, based on targets set for each region, which can provide more profitable results if managed well. With this approach, parking attendants will be motivated to achieve higher targets, while local governments can also significantly increase local revenue.

In the aspect of the process or implementation of the TPE program, the evaluation carried out includes two main aspects. The first aspect is to evaluate whether the implementation of the electronic parking system is running in accordance with the procedures and standards that have been set or not. This will provide a clear picture of the effectiveness of the system being implemented. Meanwhile, the second aspect that needs to be done is identifying obstacles and problems that may arise during the implementation of the TPE program. By understanding these obstacles, you can formulate the right strategy to overcome these problems, so that the program can run more smoothly and achieve the desired goals..

Process evaluation is essential to ensure that the program runs smoothly and effectively to fix any operational issues that may arise. The TPE program was initially designed as an effort to increase regional levies along with the implementation of regional autonomy. The TPE program was developed to replace parking management through a conventional payment system. Reported from the Pikiran Rakyat article, when still implementing the conventional payment system, the leaked parking fees reached 16 billion rupiah each year. Therefore, the TPE program began to be initiated, with discussions on identifying problems with both consultants and third parties to formulate effective and targeted solutions.

TPE parking service or popularly known as e-parking was finally officially launched by the Mayor of Bandung, Ridwan Kamil, on Jalan Braga on Friday, August 4, 2017 together with the Head of Bank Jabar Indonesia Representative Office Wiwik Sisto Widayat and the Head of Bandung City Transportation Agency Didi Ruswandi. The TPE program operates with a total of 445 TPE units on 70 roads, spread throughout the city of Bandung. Parking payments during the socialization period are allowed to be paid in cash, but the parking attendant on duty must hold an electronic money card with sufficient balance to make transactions according to the nominal value stated on the TPE. This aims to make parking service users aware and able to have an e-money card to facilitate transactions. This action is expected to help in the process of implementing parking services using TPE. Ridwan Kamil said, to maximize the use of TPE in the city of Bandung, at least a 1.5 year socialization process is needed. owever, after approximately seven years of implementing 445 TPE machines, many parking service users still do not know exactly how to use the TPE machine, in fact, some are not even aware of its existence. Therefore, until now many people still use conventional payment methods.

Data and information obtained from informants illustrate that the socialization method used has not been effective in reaching the wider community. Because from the interview results, it was found that many people do not know about the existence of TPE. This indicates a lack of effective communication and transparency from the government. From the community's lack of understanding of TPE, it creates space for illegal parking practices and abuse that are detrimental to local revenue. The government must realize that without effective socialization, all efforts to

implement a new system will be in vain. It's time to not only talk about innovation, but also to ensure that the innovation can be accessed and understood by all levels of society.

In the implementation stage, the government continues to encourage the development of this program. However, its implementation still faces challenges in its compliance with established procedures and standards. However, in practice, the implementation of this program shows a mismatch between the plan and the reality in the field. The standards set include the use of properly functioning parking machines and socialization to the community on how to use the system. However, many users reported that the parking machines often broke down, resulting in difficulties in making payments and reducing public trust in the system. Furthermore, the monitoring and maintenance procedures for parking machines that should be carried out routinely are often not carried out optimally. Although the government claims to have controlled the condition of the machines, in reality many users still experience technical problems that are not immediately addressed.

If the parking attendant has reported the problem and there is no response from the Transportation Agency, it shows that there is a big problem in parking management and accountability. Ironically, when it is time to collect the deposit, the authorities suddenly appear. This creates the impression that attention to the problem only arises when there is a financial interest, not to improve services or solve the problem. This shows a deficiency in the monitoring process, which is a very crucial stage in the implementation of this program.

Lack of effective supervision inevitably results in many parking machines being abandoned, damaged, and looking shabby. This condition not only reflects the inability to maintain the infrastructure, but also creates a negative image of the TPE program as a whole. Unmaintained parking machines become targets for vandalism, where this destructive action further worsens the situation and reduces the number of functioning machines. On the other hand, low public awareness is also a major challenge in the success of this program. Many users still do not switch to the electronic parking system because they feel more comfortable with the conventional methods they are familiar with. Another important obstacle faced by users of electronic parking terminals in Bandung City is the distance between the parking machine and the parking location which is often not close together. The distance between TPE points to other TPEs is -/+ 10 to 15 meters depending on the location and road section. However, sometimes some TPEs are often damaged, which can increase the distance that must be traveled. This is one of the challenges, especially for those who carry luggage or in certain conditions, such as bad weather. When users have to walk far to reach the parking machine, they finally choose to return to conventional payments.

This information is in line with the government's view of public awareness that tends to want instant solutions. People often look for practicality in every service they use, including in the parking system. If users feel that the parking payment process through TPE is too troublesome because of the long distance, they may prefer conventional payment methods. This can have serious consequences, where the percentage of TPE use decreases drastically and people return to manual payments. This situation not only threatens the sustainability of the electronic parking system, but also has the potential to thwart the main objectives of TPE which uphold transparency and efficiency.

When payments are made manually, the risk of revenue leakage and corrupt practices will increase again, because there is no system that can monitor transactions accurately. This is in accordance with the existing reality, because now when paying fees, many people return to conventional methods. This condition has begun to give rise to unscrupulous parking attendants who dare to violate existing standard operating procedures. They do not hesitate to unilaterally raise parking rates, which in turn creates a negative stigma in society. In addition, many parking

attendants are dishonest in reporting their daily income, feeling that they are "losing out" if they have to pay according to the applicable provisions. Of course, this is contrary to the basic principles of the implementation of TPE, which should provide clarity and accountability in the management of parking fees. Ironically, even though the need for trained parking attendants is increasingly urgent, the recruitment process for parking attendants has never been carried out specifically.

In the process of implementing the TPE program, there are still many people who do not comply with the established rates; for example, for parking for 3 hours they should pay 9 thousand, but they only pay 2 thousand or 3 thousand. This shows injustice for obedient service users and potential losses for local revenue. If this practice continues, the goal of creating a transparent parking system will fail completely. The government and managers should be more assertive in enforcing the rules and sanctions for parking rate violators. Without clear and consistent action, people will continue to feel free to ignore existing provisions, which ultimately harms all parties. It is necessary to emphasize these provisions and more widespread socialization to make people wiser in the future.

Based on the analysis of the process aspects of the TPE program, it can be concluded that the TPE program in Bandung City in practice has not been in accordance with the expected procedures and standards, resulting in many operational problems. Where many users still have difficulty using parking machines, do not even know about the TPE program and the many parking machines that cannot be used make many people return to using conventional payments. Furthermore, the process evaluation shows that the control and supervision claimed routinely by the government over parking machines and conditions in the field are not in accordance with reality.

In the product aspect, evaluating the TPE Program will focus on efforts to assess the results of program implementation, including its effectiveness, namely whether the electronic parking system has succeeded in achieving the stated objectives, such as reducing congestion or increasing user satisfaction, as well as its long-term impact on society and the parking system as a whole.

The product dimension evaluates the results and impacts of the program. In interviews, several informants admitted that although the TPE program has the potential to reduce illegal parking and increase regional income, the results achieved have not been fully satisfactory. Almost all informants indicated that if this program has not been improved and socialized properly, then the expected benefits have not been achieved.

The sustainability of the TPE program in Bandung City faces serious challenges when many people return to using conventional payment methods. Because many parking machines often experience damage, making the situation worse. As a result, regional income is far from expected, reflecting failures in system implementation and maintenance, as shown in table 2. The data in table 2 explains that the target and realization of parking revenue from 2021 to 2023 are very striking and worrying. In 2021, the revenue target set could reach more than 24 billion rupiah, but the realization achieved was only around 6 billion rupiah, reflecting an achievement that was very far from expectations. Although there was a slight increase in 2022 and 2023, where the realization of revenue was still far below the target, this shows that the electronic parking system which was expected to increase regional income has failed to meet expectations. With targets that continue to increase, but stagnant realization, it is clear that there is a fundamental problem in the implementation and public acceptance of this system.

In addition, the quality and reliability of the TPE machine are also major concerns in the product dimension. Many users report that the parking machine often experiences errors, which results in inconvenience when making payments. This not only disrupts the parking process, but

can also cause users to lose interest in using the TPE system. The declining quality of the machine and frequent technical problems can reduce public trust in the electronic parking system, so it is important for the government to carry out regular maintenance and updates.

In terms of long-term impact, the electronic parking system is expected to provide significant benefits to the community and the parking system as a whole. If operated properly, this system can reduce congestion in the city center by facilitating a more efficient parking process. By reducing the time spent looking for a parking space, it is expected that users can feel more comfortable when doing activities in urban areas. However, to achieve this positive impact, there needs to be improvements in terms of infrastructure and maintenance of parking machines so that they can function optimally.

Another long-term impact is the increase in local revenue through a more organized and transparent parking system. With the implementation of an electronic parking system, revenue from the parking sector can be more easily monitored and managed. This can make a greater contribution to city development and improving public facilities. However, to achieve this goal, it is important for the government to continue to evaluate and improve the existing system, as well as ensure that the public understands the benefits of the electronic parking system.

From the description, the important synthesis of the evaluation of the product aspects of the TPE program in Bandung City shows that although there is potential to increase efficiency and regional income, its implementation is still far from optimal. Data showing a mismatch between revenue targets and low realizations reflect problems in community acceptance, machine damage, and lack of socialization and education about this system. As a result, many users have returned to conventional payment methods, which not only hinders the achievement of revenue targets, but also indicates that TPE products have not fully met the needs and expectations of the community and also the Bandung City Government in terms of increasing revenue from the parking retribution aspect for the Bandung City Government.

Based on the analysis of the various aspects above, it can be explained that the implementation of the TPE Program in order to achieve the objectives as expected from the implementation of this TPE Program has not been achieved optimally. Various aspects that are evaluated, both from the context, input, process and output aspects of the implementation of the TPE Program, there are still several things that are lacking in achieving the objectives of the TPE program effectively. To find out what obstacles are faced in the process of implementing the TPE Program so far, the following will describe these obstacles.

## 3.2 Main Obstacles in the Implementation of the TPE Program in Bandung City

From the results of field research, several major obstacles were found in the implementation of the TPE program. These obstacles are grouped according to the aspects evaluated, namely:

A. Context Aspects of the TPE Program

In terms of context, the TPE program is considered not to be in accordance with the needs of the community due to the lack of socialization and education about this system. Many users do not understand how electronic parking machines work, so they find it difficult and tend to return to using conventional payment methods. The information obtained explains that even though the system has been implemented, many users do not understand or do not care about the existing provisions.

Urthermore, lack of socialization is a major factor that hinders public understanding of how to use TPE. Without adequate information, the public will have difficulty adapting to this new

system, which can ultimately reduce their participation in using the services provided. The problem of limited parking space using TPE is also an obstacle, where the reach of TPE services is still limited while the outskirts have not been reached. This results in inequality in the implementation of the parking system that should be enjoyed by the entire community.

Overall, these various obstacles emphasize that to achieve the objectives of the TPE program, a more comprehensive approach is needed in terms of socialization, education, and provision of adequate infrastructure. Without these steps, the TPE program is at risk of not being able to meet community expectations and potentially failing in its implementation.

B. Input Aspects of TPE Program

In terms of input, budget constraints are the main obstacle in implementing the TPE program. As a Regional Public Service Agency (BLUD), the government faces limitations in budget management which results in it being unable to recruit more employees to effectively supervise and manage the program. This has implications for the lack of supervision of parking machine operations. This lack of supervision also creates loopholes for unethical practices, such as illegal parking attendants taking advantage of the situation. People who should be using electronic parking machines instead return to conventional payment methods, which not only harms local revenue sources but also hinders the main objective of the TPE program itself, which is to create a more transparent and efficient parking system.

In addition to budget constraints, the TPE machines that are often damaged are also a major obstacle. TPE machines are the heart of the TPE program. The government should have prepared adequate infrastructure and skilled human resources to handle the maintenance and repair of these machines. Ironically, the government does not have enough skilled technicians to repair the machines that come from Sweden. This limitation is further exacerbated by the fact that spare parts for the machines must be imported from their country of origin, which of course requires additional time and costs. Thus, it appears that the government did not initially consider the sustainability and maintenance aspects in the planning of this program, which should be a primary concern to ensure the success of TPE implementation.

Another obstacle is that most users, especially motorcyclists, do not have e-money. The obstacle is the limited payment options, where payments can only be reached by 3 electronic cards BRIZZI (Bank BRI), E-Money (Bank Mandiri), and Tap-Cash (Bank BNI). The limitations in these payment options show that this system has not fully adapted to the increasingly diverse needs of modern society. This creates difficulties for users, especially for motorcyclists who tend not to have e-money cards. As a result, many of them are forced to return to using manual payment methods, which not only reduces the efficiency of the parking system, but also increases the risk of illegal levies by parking attendants. Furthermore, other information explains that with the current technological advances, the payment system should be more inclusive and offer various methods, including QRIS, which can facilitate transactions for all users. The system's inability to provide more flexible payment options reflects a lack of innovation and responsiveness to the needs of the community.

C. TPE Program Process Aspects

The constraints in the process aspect are that the monitoring and maintenance procedures for parking machines are often not carried out routinely. This condition results in many machines being damaged. The next implication is that there are difficulties for users in making payments and reducing public trust in the electronic parking system. As a result, many people return to using conventional payment methods. That means increasing the potential risk of levy leakage.

When parking attendants report broken machines, the government often does not respond quickly. Communication between the government and the field is very lacking. The government's inability to respond to reports from parking attendants certainly hampers the operation of the TPE system. This also reflects problems in management and accountability, where the government's attention seems to be more focused on collecting deposits than on maintaining and repairing the system, which should be the main priority.

From the method of collecting fees that tend to return to conventional methods, it has an impact on the recurrence of many parking attendants who do not comply with standard operating procedures, thus increasing parking rates unilaterally. Many individuals also do not report their daily income honestly, because they think that reporting accurately will harm them. This situation is certainly detrimental to the government because it will become a negative stigma in society and the level of parking fee acceptance will decline again.

In the aspect of the TPE program implementation process, the recruitment process for parking attendants was not carried out with a systematic and professional approach. In fact, trained and competent parking attendants are needed to ensure the smooth operation of the electronic parking system. The ambiguity in this recruitment process has the potential to result in a lack of skills and knowledge needed to manage a more modern and efficient parking system.

In addition, many members of the public often pay parking rates that do not comply with existing regulations. The rates that have been set are still not obeyed by many people. For example, they should pay 9 thousand rupiah for parking for three hours, but they only pay 2 thousand rupiah or 3 thousand rupiah. This shows injustice to obedient service customers and potential losses to local revenue. If this practice continues, the goal of building a clear parking system will fail completely. The government and managers must be stricter in implementing regulations and sanctions for those who violate parking rates. Without clear and consistent action, the public will continue to ignore the current situation, which will ultimately harm everyone.

D. TPE Program Product Aspects

The results of the TPE program implementation have not shown optimal performance. Many people still do not comply with the set rates, and parking attendants who violate SOPs create a negative stigma, which ultimately reduces local revenue.

In the short term, these obstacles can lead to public dissatisfaction with the electronic parking system, which has the potential to reduce public trust in the government and program managers. In addition, there will be an assumption that this program is just a waste. Public non-compliance with the tariff can be caused by a lack of confirmation from the field. This certainly hinders the achievement of the target of local revenue from parking fees. Therefore, improvements in the implementation of the TPE system must continue to be carried out, so that this does not happen.

In the long term, if this problem is not handled seriously, the impact could be worse. The negative stigma formed due to the behavior of parking attendants who violate the SOP can damage the reputation of the TPE program as a whole. The public may become more skeptical of government initiatives in managing the parking system, which in turn can reduce their participation in similar programs in the future.

## 4 Conclusion

Based on the analysis conducted, several important conclusions can be formulated from the results of this study:

a. The results of the evaluation of the implementation of the TPE program reviewed from the aspects of context, input, process and product, show that it has not been comprehensive in producing optimal TPE program implementation performance.
b. The obstacles found in the implementation of the TPE program in Bandung City, that in the context aspect, the TPE program is considered not to be in accordance with the needs of the community due to the lack of socialization and education regarding this system. Many users do not understand how electronic parking machines work, so they find it difficult and tend to return to using conventional payment methods. In addition, the reach of TPE services is still limited to urban areas, while the outskirts have not been reached. This results in inequality in the implementation of the parking system that should be enjoyed by the entire community. In terms of input, budget limitations are the main obstacle in the implementation of the TPE program. As a Regional Public Service Agency (BLUD), the government faces limitations in budget management which results in it being unable to recruit more employees to supervise and manage this program effectively. This has an impact on the lack of supervision of parking machine operations. In addition, many of the machines were broken, and the government did not have enough skilled technicians to repair the machines, which came from Sweden. This limitation is further compounded by the fact that spare parts for the machines must be imported from their home countries, which of course requires additional time and costs. Thus, it appears that the government did not initially consider the sustainability and maintenance aspects in the planning of this program, which should have been a primary concern to ensure the success of the TPE implementation. In addition, the parking system that should have been easier actually created obstacles for most users, especially motorcyclists who do not have e-money. The obstacle here is the limited payment options, where payments can only be reached by 3 electronic cards BRIZZI (Bank BRI), E-Money (Bank Mandiri), and Tap-Cash (Bank BNI). The limitations in these payment options indicate that the system has not fully adapted to the increasingly diverse needs of modern society. In terms of the process, parking machine monitoring and maintenance procedures are often not carried out routinely, resulting in many machines being damaged. This makes it difficult for users to make payments and reduces public trust in the electronic parking system. As a result, many people return to using conventional payment methods, which increases the risk of levy leakage. In terms of products, the implementation of the TPE program has not shown optimal performance. Many people still do not comply with the set rates, and parking attendants who violate standard operating procedures create a negative stigma, which ultimately reduces local revenue.
c. To overcome these various obstacles, constructive suggestions for improving the implementation of the TPE program in the future can be made as follows.
    1. The government must take proactive steps in improving parking infrastructure and maintenance and strengthening socialization to the public about the benefits and how to use the TPE system. This is important to build trust and better understanding among parking lot users.

2. The public is expected to play an active role in providing feedback and participating in socialization programs, so that they can understand and utilize the electronic parking system optimally.
3. The implementation of the TPE program must be supported by technological innovations that facilitate transactions, as well as strict supervision to ensure compliance with the established rates.
4. For further research on the Electronic Parking Terminal (TPE) program, it is recommended that a more in-depth evaluation be conducted on the impact of implementing this system on user behavior and regional income. Research can include a comparative analysis between areas that implement TPE and those that do not, as well as measuring user satisfaction with the ease and efficiency of the system. In addition, it is important to explore factors that influence the adoption of this technology among the community, such as the level of digital literacy and accessibility to electronic payment instruments. Research can also consider aspects of sustainability and innovation in the development of TPE, including integration with public transportation systems and environmentally friendly solutions. With a comprehensive approach, it is hoped that the results of the study can provide constructive recommendations to improve the effectiveness and success of the TPE program in the future.

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