TOLL ROAD TARIFF AND TOLL COLLECTION INTEGRATION POLICY IN INDONESIA: ADVANCING TOWARDS AN EFFICIENT, FAIR, AND SUSTAINABLE SYSTEM

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Abstract

Toll tariff integration in Indonesia represents a significant reform in transportation policy, aimed at enhancing efficiency, equity and sustainability. This paper explores the integration process from policy, technical, to institutional perspectives, using case studies from Greater Jakarta, Greater Surabaya, and Greater Medan regions. Findings show that integration improves average travel speed (up to 9% in Greater Jakarta region), reduces toll gate congestion, and enhances logistics cost efficiency. Nevertheless, key challenges persist, including infrastructure readiness, equitable revenue sharing among operators, and public acceptance. This study recommends a phased implementation strategy, tariff simulations based on users' Ability to Pay and Willingness to Pay, and strengthened inter-stakeholder coordination to ensure the success of toll road integration policies.

Keywords: tariff integration; transportation efficiency; sustainability; Willingness to Pay; Ability to Pay

Abstrak

Integrasi tarif tol di Indonesia merupakan reformasi yang signifikan dalam kebijakan transportasi, yang bertujuan untuk meningkatkan efisiensi, kesetaraan, dan keberlanjutan. Makalah ini mengeksplorasi proses integrasi mulai dari perspektif kebijakan, teknis, hingga kelembagaan, menggunakan studi kasus di wilayah-wilayah Jabodetabek, Surabaya Raya, dan Medan Raya. Temuan yang diperoleh menunjukkan bahwa integrasi meningkatkan kecepatan perjalanan rata-rata (hingga 9% di Jabodetabek), mengurangi kemacetan di gerbang tol, dan meningkatkan efisiensi biaya logistik. Namun demikian, tantangan utama tetap ada, termasuk kesiapan infrastruktur, pembagian pendapatan yang adil di antara para operator, dan penerimaan publik. Studi ini merekomendasikan strategi implementasi bertahap, simulasi tarif berdasarkan Kemampuan untuk Membayar dan Kesediaan untuk Membayar pengguna, dan penguatan koordinasi antarpemangku kepentingan untuk memastikan keberhasilan kebijakan integrasi jalan tol.

Kata-kata kunci: integrasi tarif; efisiensi transportasi; keberlanjutan; Kesediaan untuk Membayar; Kemampuan untuk Membayar

INTRODUCTION

The development of toll roads in Indonesia has been increasing rapidly within the last decades as toll roads become one of the National Strategic Projects (PSNs) from 2004 to 2024. Referring to Indonesia Toll Road Authority (BPJT) data as of April 2025, the operating toll road reaches 3,049.491 km, consisting of 76 toll road corridors operated by 53 Toll Road Operators (BUJTs) and 134 rest areas. The toll road network connects urban and rural areas with its corridors forming a linear pattern as main roads, such as the Trans Java

and Trans Sumatra Toll Roads, or forming a radial road system, which is built in metropolitan areas

Each corridor has unique traffic characteristics. The Trans Java and Trans Sumatra Toll Roads contribute to the development of mass mobilization of people and the distribution of logistics and services that boost the national economy. Meanwhile, toll roads in metropolitan areas, such as the Greater Jakarta, the Greater Surabaya, and the Greater Medan, have driven the increasing need for a reliable, efficient, and integrated transportation system that improves travel time.

The integrated toll road network in urban areas plays a major role in improving mobility. However, problems may arise due to tariff disparities and ineffectiveness of the toll collection system. Tariff disparities for Class I vehicles, which includes sedans, jeeps, pick-ups/small trucks, and buses, in the Greater Jakarta Metropolitan area range from IDR 7,000 (Jagorawi section with a length of 59 km) to IDR 68,500 (Cibitung-Cilincing section with a length of 34.76 km). This disparity is caused by investment costs, which are largely influenced by construction costs, as well as different construction and operation periods. This causes a large gap between toll road revenues in real conditions and toll road revenues in the business plan. For example, PT Cibitung Cilincing Port Tollways, which is the operator of the Cibitung-Cilincing Toll Road, experienced negative cash flow due to minimal traffic flow (BPJT, 2025). In addition, the operation of toll roads in metropolitan areas is less effective, resulting in a decrease in traffic volume and a decrease in service levels due to uneven traffic distribution between networks. Most road users prefer to use toll roads with lower rates even in congested conditions. In addition, the difference between the closed toll collection system and the open toll collection system also causes congestion due to the presence of toll gates on main roads. This results in toll road users having to pay several times in one trip, depending on the number of sections passed. This type of tariff scheme not only creates inefficiencies in transactions, but also complicates travel planning, reduces user comfort, and has the potential to create a disproportionate cost burden, especially for short-distance users who pass through many toll gates.

In response to these problems, the Government, through BPJT, and toll road operators have begun to initiate a policy of integrating toll rates and collection as one of the strategies for improving the toll road management system. This concept aims to create an effective, efficient and user-friendly toll rate and collection system so as to improve the quality of service and create a sustainable toll road industry. This target can be achieved by combining several toll road sections into one network system so that it has a single toll rate and collection system, with the principles of fairness and efficiency. For example, the Jakarta Outer Ring Road (JORR) toll road network in the Greater Jakarta Metropolitan area has implemented a toll road integration system by combining rates and eliminating barriers on main roads between several sections. This policy is being implemented in the Greater Surabaya and the Greater Medan areas, but its impact still requires in-depth and comprehensive empirical studies.

The literature review shows that tariff integration has the potential to improve operational efficiency and road user convenience, but can also create negative perceptions if not balanced with transparency and fair adjustments. Therefore, it is important to understand how this tariff integration affects user behavior, traffic distribution, service levels, and toll road operator revenues. In addition, technical and social factors such as the readiness of the electronic transaction system, public communication, and perceptions of tariff fairness are important variables that contribute to the success of this policy.

This study uses quantitative and qualitative approaches through analysis of primary and secondary data collected from toll road operators, road users, and related policy sources. The methodology applied includes evaluation before and after the implementation of tariff integration, comparison of tariff structures, and analysis of traffic distribution. The research areas were selected based on the characteristics of the toll road network, the complexity of the section structure, and the existence of plans or implementation of tariff integration policies.

The problem discussed in this paper is how the implementation of tariff integration policy affects cost efficiency and comfort of toll road users. The technical and social impacts arising from the implementation of tariff integration in the study areas are also studied. Furthermore, the readiness of each study area in supporting a comprehensively integrated tariff system is reviewed. This paper aims to: (1) evaluate the impact of tariff integration policy on tariff structure, travel efficiency, and traffic distribution on the toll road network, (2) identify technical and social challenges faced in implementing the policy, and (3) provide recommendations and data-based analysis for improving tariff integration policy in the future, in order to support the creation of a fairer, more efficient, and more sustainable toll road transportation system.

LITERATURE REVIEW

Toll Road Transaction System Concept

The concept of a toll road transaction system is a mechanism for collecting toll road users as a form of payment for toll road services. This system aims to distribute traffic between networks, improve operational efficiency, and support the maintenance and development of toll roads. According to Government Regulation No. 23 of 2024, toll collection is carried out with a tariff system that is determined based on the total length of the trip or the average length of the trip of road users.

The toll road collection and tariff are set as an open system and a closed system. The open system allows users to pay only once with a fixed rate for one trip within a certain toll road section or corridor. Users will be charged a single rate according to the rate per km and the average length of the trip at the entrance or exit of the toll road section or corridor. This system provides convenience and increases the average daily traffic volume, especially for long-distance traffic. On the other hand, a closed system charges road users based on the

distance traveled. Road users will be detected at their origin and destination, through entrances and exits. This system aims to provide fairer rates and monitor the movement and average daily traffic volume.

There are 3 types of tariff systems that apply in Indonesia (Pamboedi, 2024). The definition of each toll road collection is presented in Table 1. Tariffs, Operations, and Toll Collection Systems on several toll road sections are presented in Tables 2 and 3.

Table 1 Tariff System and Explanation

Tariff System	Explanation
Distance-based	Tariffs are calculated based on mileage (origin-destination)
Flat-based	Fixed rate for all segments in one corridor
Zoning Flat-based	Rate based on a specific zone

Source: Pamboedi (2024)

Table 2 Toll Road Tariff, Operation and Toll Collection Systems

System	Single Toll Road			Integrated Toll Roads			
Toll road operation and collection	Closed	Open		Closed	Open		
Tariff	Distance Based	Flat-based	Zoning Flat-based	Cumulative of each corridor	Distance Based	Flat-based	Zoning Flat-based

Source: Pamboedi (2024)

Table 3 System Matrix and Implementation

No.	Category	Toll Road
1	Single; Closed; Distance Based	Sigli-Banda Aceh, Palembang-Indralaya, Balikpapan-Samarinda, Manado-Bitung
2	Single; Open; Flat-based	Bali Mandara, Prof. Dr. Ir. Soedijatmo, Jakarta-Bogor-Ciawi, Depok-Antasari, Semarang ABC
3	Single; Open; Zoning Flat-based	Bekasi-Cawang-Kampung Melayu
4	Integrated; Closed; Cumulative of each corridor	Cluster 1-2 Transjawa (Cikatama-Kalikangkung) Cluster 1 Selatan (Kalitama-Ujung Jaya Utama) Cluster 3 Transjawa (Banyumanik-Warugunung) Cluster 4 Transjawa (Kejapanan-Probolinggo-Malang) JTTS 1 (Bakauhuni-Palembang) JTTS2 2 Medan Metropolitan JORR II (Cengkareng – Limo/Cinere)
5	Integrated; Closed; Distance Based	Not yet (In this condition, the integration of toll rates/km is carried out to be the same on several toll road corridors)
6	Integrated; Open; Flat-based	JIUT, JORR I (Cengkareng-Cilincing), Jakarta-Tangerang-Cikupa
7	Integrated; Open; Zoning Flat-based	Jakarta-Cikampek II Elevated (MBZ)
8	Integrated; Closed, Flat-based	Soreang-Pasir Koja in Cluster 1 Selatan (Kalitama-Ujung Jaya Utama

Source: Pamboedi (2024)

Toll Road Integration and Tariff Determination Framework

Toll road integration is the unification of toll road tariff systems and toll road collection systems in several toll road corridors in one or more toll road networks (Abadi, 2024). The objectives are: (1) to reduce logistics costs, (2) to reduce congestion due to reduced transaction points, (3) to increase the Average Trip Length (ATL), (4) to balance toll road tariffs based on Ability to Pay (ATP), Willingness to Pay (WTP), and Vehicle Operating Cost Profit Cost (BKBOK), and (5) to create a balance in traffic distribution.

The integrated tariff system is the result of a model determined by several variables, such as traffic, revenue projections, and revenue reconciliation between operators. Traffic modeling is carried out based on the average daily traffic volume passing through a toll road section or corridor and is modeled on a certain network within a certain period of time. Neutral revenue is toll road revenue under normal traffic conditions for each operator as the basis for revenue reconciliation and a benchmark in formulating tariff integration, where the objective of this policy is to maintain the investment climate. However, there are several underlying factors, as stated in Law Number 2 of 2022 and Government Regulation Number 23 of 2024, concerning the Toll Road Integration System. Toll road tariffs are used for Investment Returns, Toll Road Preservation, and Toll Network Development.

To summarize, there are 2 main toll road toll collection systems, namely an open system with a fixed tariff and a closed system with a distance-based tariff. Tariff integration is a combination of transaction and tariff systems of several toll roads that were previously managed separately. The main objectives are to reduce logistics costs, reduce transaction points, extend average travel distances, adjust tariffs based on the ability and willingness to pay of toll road users and vehicle operating costs, and create traffic balance.

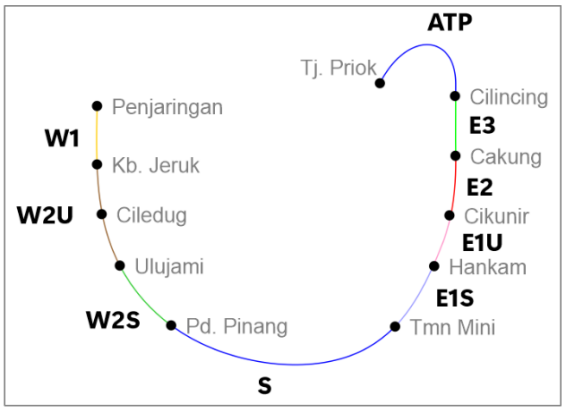
The determination of integrated tariffs takes into account traffic modeling, revenue projections, traffic volume distribution, and revenue reconciliation between toll road operators. Current laws and regulations, such as Law Number 2 of 2022 and Government Regulation Number 23 of 2024, support periodic and dynamic evaluation and adjustment of tariffs, including managing revenue differences for the construction of new toll road networks.

CASE EXAMPLES OF TARIFF INTEGRATION

A descriptive qualitative method with a case study approach was used in this study. Data were obtained from regulatory documents, BPJT reports, and case studies of the integration of the Jakarta Outer Ring Road (JORR) with other metropolitan areas. The following are lessons learned from the integration of transaction and tariff systems on toll road networks in some Metropolitan areas, which include the Greater Jakarta Metropolitan, Greater Surabaya, and Greater Medan Areas.

Greater Jakarta Metropolitan Area

The integration of the JORR 1 Toll Road Section has been implemented since September 29, 2018, based on the Decree of the Minister of Public Works and Public Housing Number 710/KPTS/M/2018. Based on the learning report, the implementation of the system integration and definition of toll roads managed by Jasa Marga (in 2024) connected to the JORR Toll Road is that the integration of the Jakarta Outer Ring Road (JORR) Toll Road is carried out to increase the efficiency of the toll collection system by reducing the number of gates on the main roads that cause congestion. The main purpose of this integration is to optimize the performance of the road network, reduce transaction points so as to significantly increase travel time efficiency, and provide a more practical toll collection system for toll road users and operators. The JORR toll road sections and their operators can be seen in Figure 1.



Ruas JORR W1	PT Jakarta Lingkar Barat Satu
JORR W2 Utara	PT Marga Lingkar Jakarta
JORR W2 Selatan	PT Jasa Marga (Persero) Tbk
JORR S	PT Hutama Karya
JORR E1	PT Jasa Marga (Persero) Tbk
JORR E2	PT Jasa Marga (Persero) Tbk
JORR E3	PT Jasa Marga (Persero) Tbk
Akses Tanjung Priok	PT Hutama Karya
Pondok Aren – Ulujami	PT Jasa Marga (Persero) Tbk

Source: BPJT (2024)

Figure 1 The JORR Toll Road Sections with Each Operator

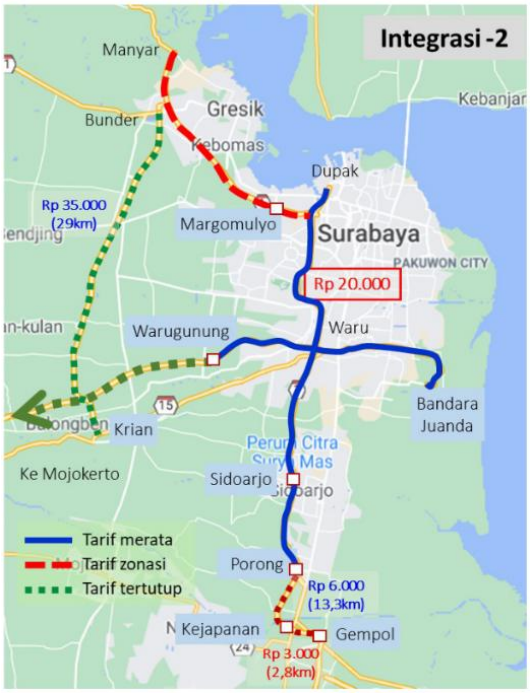
According to Jasa Marga (2024), after integration, the main benefits obtained are that queues and congestion at exits and gates are reduced, for example by eliminating the Kayu Besar, Meruya Utama, Rorotan, and Pondok Ranji Wings BSD toll booths. In addition, the average travel speed increases, such as on the Gadog-UKI section which increased (4-9)%. Logistics costs are also more efficient, because freight vehicles that previously stopped (2-3) times now only stop 1 time with a lower rate. Furthermore, transaction effectiveness increases with the elimination of the dual tariff system that previously occurred in several sections.

There are several challenges faced in the integration process. First is the need for adjustments to the transaction system, especially in recalculating tariffs based on Ability to Pay (ATP) and Willingness to Pay (WTP). Second is the need for accurate traffic volume calculations in the distribution of revenue between toll road operators so as not to harm certain parties. Third is the change in road user habits, where some road users experience an increase in tariffs, although the majority of road users experience a decrease or no change in tariffs.

The evaluation results show that this integration has a positive impact in the long term. Traffic efficiency has increased with a decrease in the Volume to Capacity Ratio (V/C Ratio) from 0.7 to 0.5 in several toll roads. The average trip length has also increased by around 31.5%, which means that the utilization of toll roads has become more optimal. Although there are challenges in revenue sharing and socialization to road users, overall, this integration has succeeded in improving operational performance and comfort for toll road users.

Greater Surabaya Area

The integration of transaction and settlement systems in the Greater Surabaya area aims to improve the efficiency of the toll road network, reduce queues at toll gates, and simplify the payment system. The main problems before the integration were the existence of large number of transaction points that caused congestion, differences in tariffs between toll roads, and the need to optimize traffic distribution in the Surabaya Metropolitan area. This integration is expected to increase travel speed, reduce travel time, and cost efficiency for toll road users, especially for logistics vehicles that often pass through industrial areas and ports. In addition, this integration is also intended to adapt the toll system to a more sustainable urban transportation policy (see Figure 2).



Source: Jasamarga (2024)

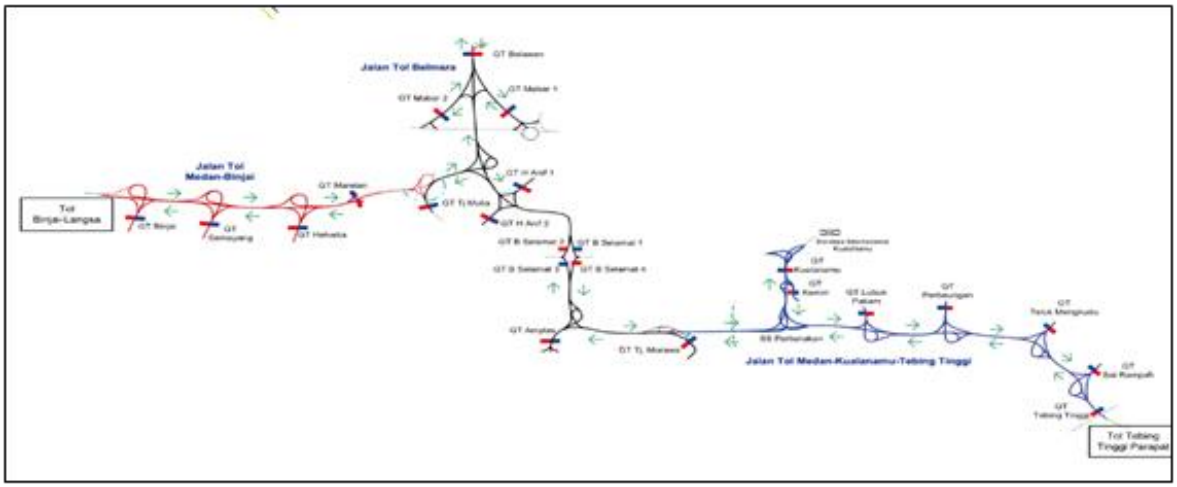
Figure 2 Integration of the Greater Surabaya Toll Road

Some of the main benefits gained are increased travel speed, especially at points prone to congestion, such as Simpang Waru, which experienced an average speed increase of 194%. Another benefit is reduced queues at toll gates due to the elimination of several

toll gates that previously caused traffic congestion. Operational efficiency also occurs, because with the reduction in transaction points, toll road users only need to make 1 payment, so that vehicle operating costs decrease significantly. With more even and optimal traffic redistribution, road network performance also increases. In addition, the predicted long-term benefits of this integration are savings in vehicle operating costs and travel time, which are estimated to reach IDR2.941 billion/day in 2025, and increase to IDR14.318 billion/day in 2040.

Greater Medan Area

The integration of the operating system and toll rates in Greater Medan Area is based on the national spatial planning policy, which designates the Medan, Binjai, Deli Serdang, Karo (MEBIDANGRO) area as the National Activity Center (PKN). With the operation of the Tanjung Mulia Junction in March 2021, the toll road network system in this area has been well connected, thus improving traffic movement and access to transportation hubs, such as Belawan Port and Kualanamu Airport (see Figure 3). However, there is a tariff disparity between the old Belawan-Medan-Tanjung Morawa (Belmera) toll road and the new Medan-Kualanamu-Tebing Tinggi (MKTT) and Medan-Binjai toll roads. Therefore, a more integrated and coherent tariff system is needed to be in line with the concept of sustainable development.



Source: Cipta Sarana Marga (2024)

Figure 3 Toll Road Network System in the Greater Medan Area

Several integration scenarios were studied and it was found that the Binjai-Kualanamu grouping was the scenario that gave the most positive impact. Tariff adjustments in this scenario are expected to increase the efficiency of the toll road system and more even distribution of traffic.

The impact on travel is a decrease in the number of tapping transactions from 3 times to 2 times on a number of toll road sections. In addition, around 57.34% of toll road users

are estimated to pay higher rates, but there was a correction of up to -11.58%. On the other hand, 55.5% of other toll road users paid lower rates than before.

Regarding efficiency and tariff optimization, the recommended tariff range is IDR12,000 - IDR20,000. The optimal tariff for the Binjai-Kualanamu cluster is IDR18,000 to maintain revenue neutrality.

The integration of the operating system and toll rates in the Greater Medan area aims to create a more efficient, equitable, and national spatial planning policy-compliant spatial plan. With this integration, it is expected that there will be increased connectivity and ease of access for toll road users as well as optimization of toll operator revenues.

DISCUSSION

The integration of toll road transaction and tariff systems in metropolitan areas, such as Greater Jakarta Metropolitan, Greater Surabaya, and Greater Medan Areas, aims to improve operational efficiency, reduce congestion at toll gates, and simplify the payment system for road users. In JORR, the integration has succeeded in reducing queues and increasing travel speed, as well as lowering logistics costs. The Greater Surabaya recorded significant improvements in traffic speed and vehicle cost efficiency, with significant savings projected in the future. Meanwhile, the integration in the Greater Medan helps align tariffs between old and new toll roads, and encourages equal distribution of traffic and operator revenue. Overall, this integration brings great benefits in supporting smoother and more efficient urban mobility.

Tariff integration has an impact on travel cost efficiency and reduced travel time. This system is very beneficial, especially for freight vehicles or logistics vehicles that are sensitive to travel time. A real example of the efficiency generated by tariff integration can be seen in the implementation of integration on the JORR Toll Road. Before integration, logistics vehicles had to stop at several toll gates spread along the route, resulting in queues and longer travel times. After integration, the transaction system is only carried out once, so that vehicles can move without obstacles.

As a result, the average speed has increased significantly. An example is on the Gadog-UKI route, which recorded an increase in speed of 4%-9%. This efficiency reduces vehicle operating costs and reduces fuel consumption. In addition, with the elimination of several toll gates, such as the Rorotan Toll Gate and the Meruya Utama Toll Gate, congestion points that have so far hampered the distribution of goods have also been reduced. Thus, tariff integration not only simplifies the transaction process, but also directly reduces travel time and logistics costs, which is very important for the industrial and distribution sectors.

Tariff reductions for most vehicle categories have a positive impact on the cost of distributing goods, industrial competitiveness, and commodity prices in the market. A real example of tariff reductions that have a positive impact on the distribution of goods and industrial competitiveness can be seen in the integration of tariffs in the Greater Surabaya

area, especially after the implementation of a one-time tariff system on toll roads that previously had several transaction points.

Before the integration, logistics vehicles passing through the Waru-Sidoarjo and Waru-Perak sections had to pay at each toll gate, so the total cost of the trip was high. After the integration was carried out, only one transaction was required for the entire trip, resulting in a decrease in effective tariffs for Class I to Class IV vehicles. As a result, the cost of distributing goods decreased, especially on routes related to shipping, which are often used by the industrial and port sectors.

The direct impact of the reduction in distribution costs is that commodity prices become more stable or decrease in the market because the logistics cost component decreases. Local industries also become more competitive, because the cost of shipping raw materials and distributing final products becomes more efficient. In addition, Small and Medium Enterprises (SMEs) also benefit because they can access distribution channels at lower costs. Overall, this tariff reduction encourages broad economic efficiency, strengthens industrial competitiveness, and maintains the affordability of goods in the market.

There are several challenges in implementing toll road tariff integration. The first is the reconciliation of revenues between toll road operators. In an integration system, one transaction covers several toll road sections that can be managed by several operators. The challenge arises when determining a fair distribution of revenues between operators, which requires a transparent and mutually agreed calculation system based on travel origin-destination data and traffic volume. The second is the demolition and construction of new gates. Integration requires a reduction in the number of toll gates to facilitate vehicle flow, resulting in several old gates being demolished and new infrastructure being built. This process requires large costs, careful planning, and traffic management during the construction period so as not to disrupt road users. The third is the adjustment of the transaction software system. Toll transactions that were previously limited to 1 section must now be integrated with several sections in one system, which requires updating or replacing the software system in order to be able to read, record, and share transaction data between toll road operators accurately. Finally, the fourth is the need for socialization to toll road users. Changes to the transaction and tariff systems require understanding from road users. Without good socialization, users can be confused or feel disadvantaged. Therefore, effective communication is needed through mass media, information boards, and education in the field so that the public understands the benefits and how the new system works.

The strategy to achieve success in implementing toll road tariff integration can be explained as follows. First, an in-depth study is conducted on Ability to Pay, Willingness to Pay, and Vehicle Operating Cost Profit Cost, which are important indicators in determining fair and rational tariffs. The study of these three aspects is intended to ensure that the integrated tariff does not burden road users, remains economically attractive, and is in accordance with vehicle operating costs in the field. The next step is the formation of a joint toll revenue control team, so that the revenue reconciliation process runs smoothly and transparently. This team consists of representatives of toll road operators and the government,

and is tasked with controlling and monitoring the flow of revenue and resolving potential conflicts between toll operators. The third is the preparation of a revenue sharing formula based on the origin and destination of the trip. The last is the legality of the operational cooperation agreement between toll road operators, to avoid legal conflicts in the management and distribution of integrated toll road revenues.

Although the integration of tariffs and transaction systems provides many benefits, there are several challenges that must be faced. From a technological and operational aspect, an improvement in the automatic transaction system is needed, such as Multi Lane Free Flow, to further optimize the smoothness of transactions. In addition, integration between toll road operators requires a digitally integrated system. From a social and economic aspect, fair tariff adjustments must be made so as not to burden users, but still provide benefits to toll operators. It should also be noted that the impact of tariff increases on users due to integration can cause resistance from road users, especially from the logistics vehicle group. From a regulatory and policy aspect, coordination is needed between all related parties. For this reason, it is necessary to synchronize tariff policies between the Ministry of Public Works, Toll Road Regulators, and Toll Road Operators, so that tariff policies can be implemented consistently. In addition, a clear formulation is also needed in the distribution of revenue between toll road operators.

CONCLUSIONS

Toll road integration is a systematic step to simplify transactions and tariffs between toll roads that previously stood alone. The main goal is to create a toll road management system that is more efficient, effective, and fair for all parties involved, including the government, road users, and toll road business entities.

From the government's perspective, toll road integration aims to improve national connectivity, reduce logistics costs, and encourage efficiency of the road network. Integration also opens up opportunities for increasing state revenue through Non-Tax State Revenue from toll road profits. For road users, integration provides convenience in the form of reduced queues at toll gates, simplified transactions, and time and fuel efficiency.

Toll road operators also gain a number of benefits, such as reduced operational costs due to the absence of substations and human resource efficiency, as well as the potential for increased revenue and improvements in the investment climate. However, this also presents new challenges in terms of revenue sharing and the need for a clearing system between toll road operators.

Some of the positive impacts of the integration are increased travel speed, transaction efficiency, and a decrease in the average long-distance travel fare per kilometer. Operational costs have also decreased due to the reduction in the number of transaction points. However, there are also negative impacts that need to be anticipated, such as increased fares for short-distance travel, the potential for diversion of traffic flow to non-toll roads, and challenges in formulating fair fares for all vehicle classes.

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