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Analysis of the Potential for Implementing an Electronic Road Pricing (ERP) System on National Roads in Bandung City

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A B S T R A C T

Traffic congestion is a common problem in developing countries including Indonesia, especially in dense urban areas such as Bandung City. This study analyzes the potential for the implementation of Electronic Road Pricing (ERP) on Jl. Soekarno Hatta (Gedebage Intersection - Cibiru Roundabout), Bandung City. Traffic characteristics show a Saturation Degree (DJ) value of 0.85 in the morning and afternoon and 0.75 in the afternoon, with Level of Service (LoS) E and D. Congestion costs reach Rp 47,710,714 (morning), Rp 55,759,813 (afternoon), and Rp 75,905,411 (afternoon) per hour. The results show that the implementation of Electronic Road Pricing (ERP) system can reduce the use of private vehicles and increase the efficiency of congestion costs. Thus, the Electronic Road Pricing (ERP) system is a relevant travel demand management strategy in urban areas of Indonesia.

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INTRODUCTION

Congestion is one of the traffic problems faced by developing countries such as Indonesia and is common in dense urban areas (Akhmad Hermawan & Haryatiningsih, 2022). This congestion has become part of the characteristics of a particular urban center area due to its regular occurrence especially at certain times such as office departure hours, work return hours, weekends and holidays (Akhmad Hermawan & Haryatiningsih, 2022).

One of the problems that is often experienced today is traffic congestion in Bandung City (Dewi et al., 2020). Bandung is the most congested city in Indonesia, even beating other big cities such as Surabaya and Jakarta (Akhmad Hermawan & Haryatiningsih, 2022b). Based on data from the Central Bureau of Statistics (BPS) of West Java Province, the population of Bandung City in 2024 reached 2.528 million people. Bandung is nicknamed the *City of Flowers*, because in ancient times the city was considered very beautiful with many trees and flowers growing there. In addition, Bandung, known as the "*Paris Van Java*", has a rich history of European-style architecture from the colonial era, especially along Braga and Asia Africa streets (Aprillia et al., 2021). Bandung was originally a small village that transformed into the largest metropolitan city in West Java and became a large urban center known for its natural beauty, culture, culinary, and shopping center (Pramezwary & Hubner, 2021). Bandung City continues to experience infrastructure development, including transportation networks, shopping centers, and other public facilities, to support the growth and convenience of the community.

As is known in big cities, traffic conditions on Jl. Soekarno Hatta (Gedebage Intersection - Cibiru Roundabout) in Bandung are still poor with high levels of congestion and inadequate road sections, including parking problems and high air pollution. The rapid population and economic growth in Bandung City has led to an increase in both two-wheeled and four-wheeled vehicles. The increase in vehicle ownership is not matched by limited road infrastructure, causing traffic congestion on national roads in Bandung City, such as Jl. Soekarno Hatta (Gedebage Intersection - Cibiru Roundabout) Bandung City.

To reduce the proportion of ownership and use of private vehicles, one of which must be improved is by improving public transportation services, as well as the appropriate level of safety and comfort of travel. In addition to improving public transport services, several steps need to be taken to encourage the reduction of private car users, namely the implementation of Electronic Road Pricing (ERP) for congestion control (Nomleni, 2019). The Electronic Road Pricing system has been implemented in several countries on certain roads.

Electronic Road Pricing is a paid road system that is applied electronically on a road section for each vehicle that passes through it (Adilah et al., 2020). Electronic Road Pricing (ERP) System is the implementation of electronic based . The advantage is that it facilitates the payment process and allows different tariffs to be applied according to traffic congestion conditions , with the aim of reducing the number of private vehicles passing through the Bandung City national roads such as on Jl. Soekarno Hatta (Gedebage Intersection - Cibiru Roundabout) Bandung City.

LITERATURE REVIEW

Transportation

According to Tamin (1997) transportation is one of the supporting aspects of the nation's progress, especially in the economic activities of the State which cannot be separated from the influence of population growth. One of the easiest means of transportation at this time to obtain and use is public transportation (Said et al., n.d.) and consumer preferences for goods produced are factors that have an influence on Gross Regional Domestic Product (GRDP) (Amifudin & Anggraini, n.d.).

The role of transportation is the activity of transporting or moving cargo (goods and passengers) from one place to another, which is very vital for the economy and development as well as supporting facilities for the development and growth of other sectors and reducing Carbon Dioxide emissions CO2 (Jurnal Moda Transportasi Darat Dan Kualitas Layanan Jasa Terhadap Kelancaran Arus Container Di Depo, N.D.). In addition, one of the most popular and frequently used means of transportation today is public transportation (Said et al., n.d.).

Road Geometrics

A road is a man-made physical form used to facilitate the movement of people and goods in a relatively shorter time. Therefore, the road must be planned and designed to be able to provide optimal service for its users (Hasibuan, n.d.). Zudhyirawan (2017) says the role of roads is part of the transportation infrastructure which has an important role in the economic, socio-cultural, environmental, political, defense and security fields, and is also used for the greatest prosperity of the people.

Fambella in Al Adilah et al, (2014) said that road geometrics are roads that physically have a function as a determinant of comfort and safety levels (Al'Adilah et al., 2021). Well-designed road geometrics also support driving comfort for users. This includes consideration of road surface slope, proper elevation settings, and smooth traffic movement (Lutfie, n.d.).

Traffic Management

Traffic in Law No. 22 of 2009 is defined as the movement of vehicles and people in road traffic space, while what is meant by road traffic space is infrastructure intended for the movement of vehicles, people, and/or goods in the form of roads and supporting facilities (*240-499-1-SM*, n.d.).

Talking about traffic and road transportation is inseparable from congestion and it cannot be denied that congestion occurs not only in big cities but even small cities have congestion (*179-Article Text-686-1-10-20211019 (1)*, n.d.). Congestion is a condition where at one time there is a buildup of vehicle volume on a road section, resulting in unsmooth traffic flow.

Traffic management is the process of regulating and controlling traffic flow by optimizing the use of the existing road system to meet transportation needs efficiently, orderly, safely, and smoothly without the need for additional new infrastructure. The objectives of traffic management include improving the

efficiency of movement, road user safety, and protection of environmental conditions around the road (Sudini, 2021).

Electronic Road Pricing

Travel demand management (TDM) is a series of strategies, policies, and actions designed to manage travel demand in a region. One of its objectives is to reduce congestion and move toward a sustainable transport system policy (Pratama et al., 2022).

Generally, Travel Demand Management (TDM) encourages people to reduce unnecessary travel (especially for those using private vehicles) and encourages people to use other modes of transportation (Pratama et al., 2022). An example of a strategy or policy for implementing Travel Demand Management (TDM) is Electronic Road Pricing (ERP).

Electronic Road Pricing is an electronic toll system applied to a specific road section for every vehicle passing through it (Adilah et al., 2020). Its purpose is to prevent traffic congestion. The Electronic Road Pricing (ERP) system is similar to those in other countries such as the United Kingdom, Sweden, Italy, Hong Kong, and Singapore, which have successfully implemented the ERP system in controlling traffic congestion (Hamzah & Kurniawan, n.d.).

If the Electronic Road Pricing (ERP) system is implemented, drivers will face several options, such as paying a fee for the journey, adjusting the travel time to get a lower rate, choosing another route or mode of transportation, changing the destination, or even canceling the trip.

Previous Research

Various previous studies have discussed the effectiveness and challenges of ERP implementation. Menon (2004) found that ERP implementation in Singapore successfully reduced vehicle volume by 13% and increased average vehicle speed by 20%. Meanwhile, Santos (2005) in his study in London stated that congestion pricing contributed significantly to reducing congestion and carbon emissions in the city center.

In Indonesia, several studies have also been conducted. Putra et al. (2018) analyzed the potential of ERP implementation in Jakarta and concluded that although it is technically possible, there are still challenges in legal aspects, infrastructure readiness, and public acceptance. Handayani and Pratama (2021) conducted a study of public perceptions of ERP and found that the fairness of tariffs and transparency in the use of funds were the main concerns of the public.

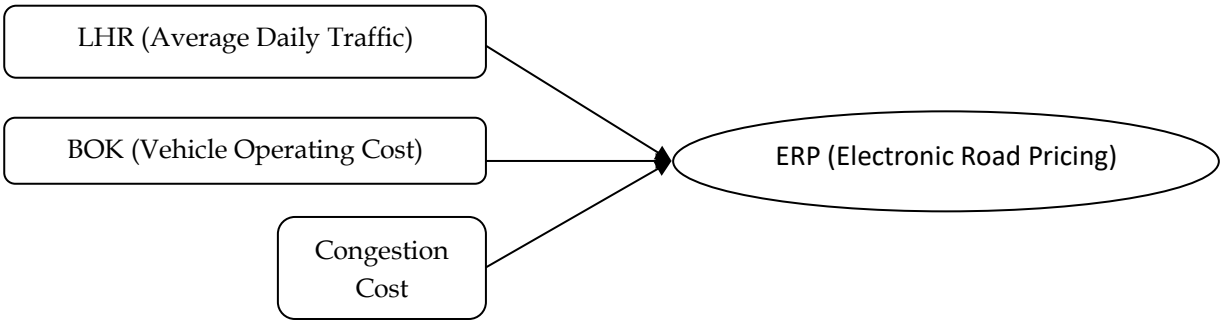


Figure 1. Thinking Framework

METHODOLOGY

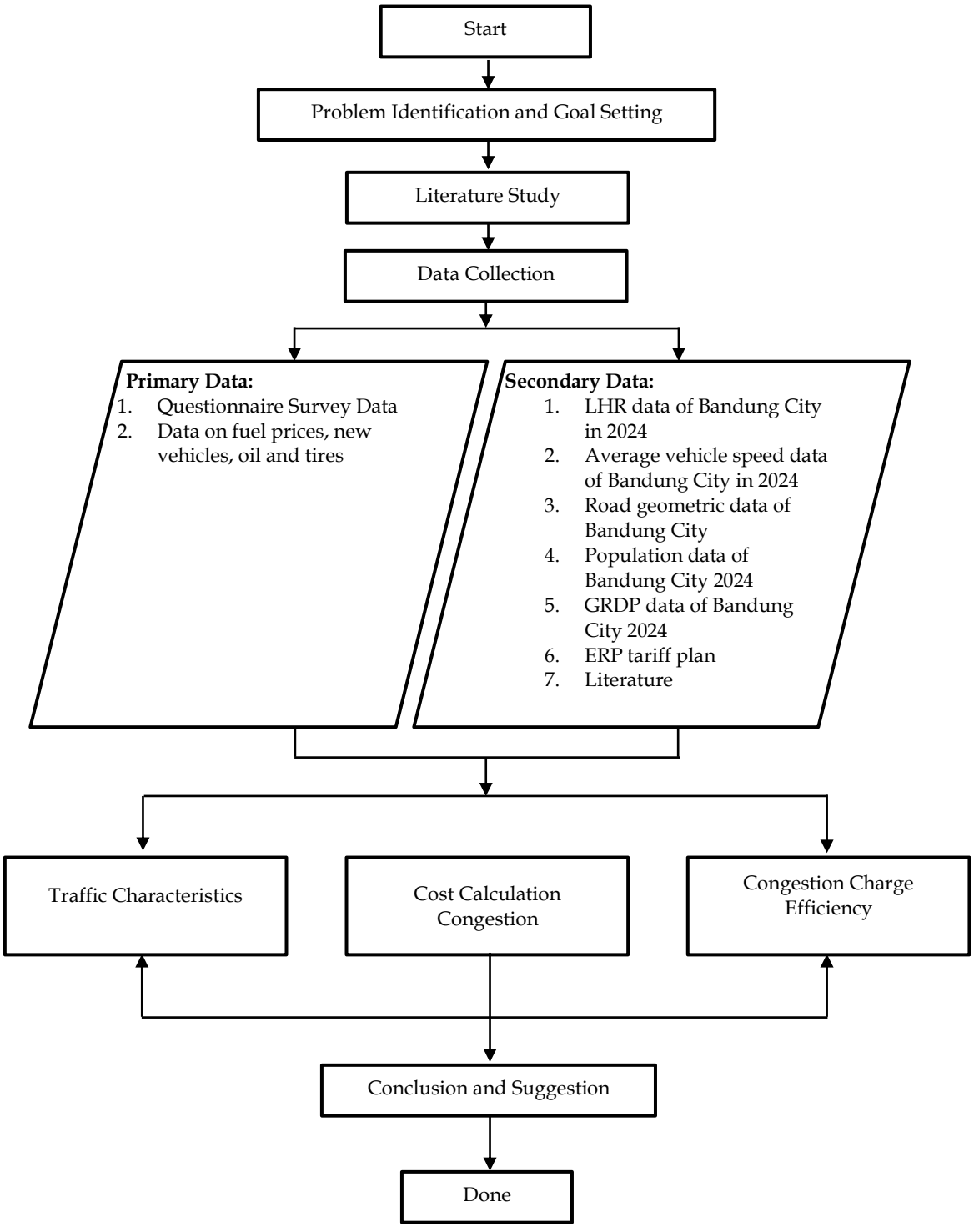


Figure 2. Research Flowchart

From the picture above, this research uses quantitative methods to analyze the effect of congestion cost efficiency and vehicle operating costs on the level of congestion. This research was conducted in Bandung City, West Java Province using secondary data in the form of Bandung City Average Daily Traffic Data in 2024, Bandung City average vehicle speed data in 2024, Bandung City Road geometric data, Bandung City 2024 population data, Bandung City 2024 GRDP data and Electronic Road Pricing (ERP) Tariff Plan. Based on data from the Central Bureau of Statistics 2025, the population of the city of Bandung amounted to 2.528.163 people, with the calculation of the slovin formula obtained a research sample of 100 respondents. Using binary logistic analysis with the help of SPSS software.

RESEARCH RESULTS

To comprehensively analyze traffic characteristics, the actual capacity of the road needs to be calculated using the Capacity Calculation formula, then combined with the degree of saturation values to determine the periods of heavy traffic in the morning, afternoon, and evening while estimating the potential loss of service.

1. Capacity

$$C = C_0 \times FC_{LJ} \times FC_{PA} \times FC_{HS} \times FC_{UK}$$

$$C = 13600 \text{ x } 0.92 \text{ x } 1 \text{ x } 0.88 \text{ x } 1 = 11011$$

2. Degree of Saturation

$$DJ = \frac{q}{c}$$

$$DJ = \frac{3019}{11011}$$

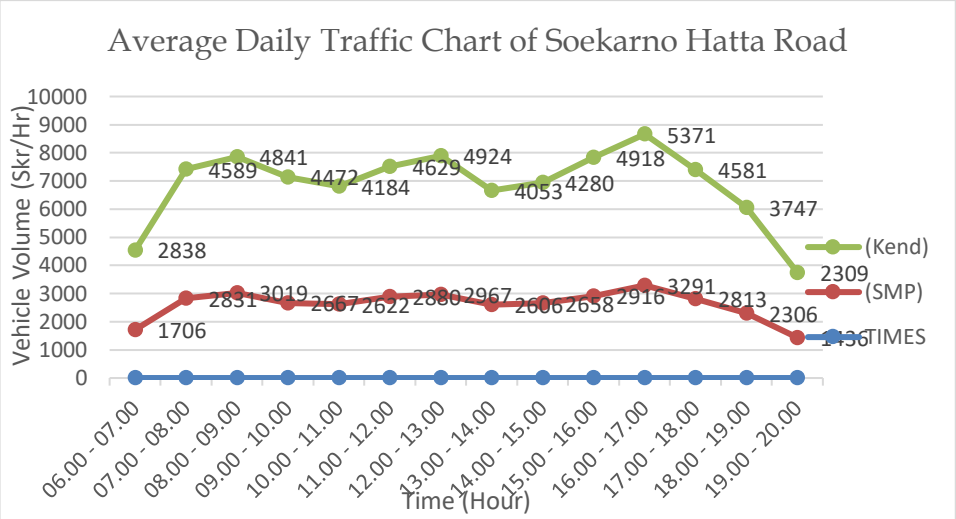
$$DJ = 0{,}27$$

Table 1. LoS (Level Of Service) Soekarno Hatta Road

V/C RATIO			Level Of Service		
Morning	Day	Afternoon	Morning	Noon	Afternoon
0,85	0,75	0,85	E	D	E

Based on Graph 1, below, the results of the analysis show that the LoS (Level of Service) level on Jl. Soekarno Hatta (Gedebage Intersection - Cibiru Roundabout) is E in the morning, D in the afternoon, and E in the afternoon, with values between 0.75 and 0.85. This indicates that the traffic flow is almost unstable, where vehicle speeds begin to be disrupted and decrease due to insufficient road capacity.

Figure 3. Average Daily Traffic on Soekarno Hatta Road



3. Time value

$$\lambda = \frac{\frac{371.845.620}{2.528.163}}{2080}$$

= 0.0707 Rupiah/Hour

4. Waiting Time

T $= W_T$e $- W_T$ i

T $= 0{,}058 - 0{,}054$

T $= 0{,}004$/hour

Table 2. Queuing Time of Soekarno Hatta Road

Road Name	Road Length (Km)	Normal (Ideal)		Traffic Jam (Existing)		Delay (T)
		Speed Km/h	Travel Time	Speed Km/h	Travel Time	
Soekarno Hatta (Morning)	2,69	50	0,054	46,3	0,058	0,004
Soekarno Hatta (Afternoon)	2,69	50	0,054	45,6	0,059	0,005
Soekarno Hatta (Afternoon)	2,69	50	0,054	44,6	0,060	0,007
Soekarno Hatta (Average)	2,69	50	0,054	45,50	0,059	0,005

5. Vehicle Operating Cost

BOK = BT + BTT

Table 3. Vehicle Operating Costs

Vehicle Type	BT (Rp/km)	BTT (Rp/km)	BOK (Rp/km)
Car/Passenger *Vehicle*	Rp2,979	IDR2,722	Rp5,702
Utility/Purpose *Vehicle*	Rp2,728	Rp2,893	Rp5,621
Small *Bus*	Rp6,433	Rp6,756	Rp13,189

Vehicle Type	BT (Rp/km)	BTT (Rp/km)	BOK (Rp/km)
Large *Bus*	Rp7,840	Rp6,841	Rp14,681
Light Truck/Light *Truck*	Rp3,764	Rp4,879	Rp8,643
Medium *Heavy Truck/Truck*	Rp6,485	Rp6,430	Rp12,915
Heavy *Truck/Truck*	Rp8,747	Rp9,893	Rp18,640
Total			Rp79,391

Figure 4. Non-fixed and fixed costs

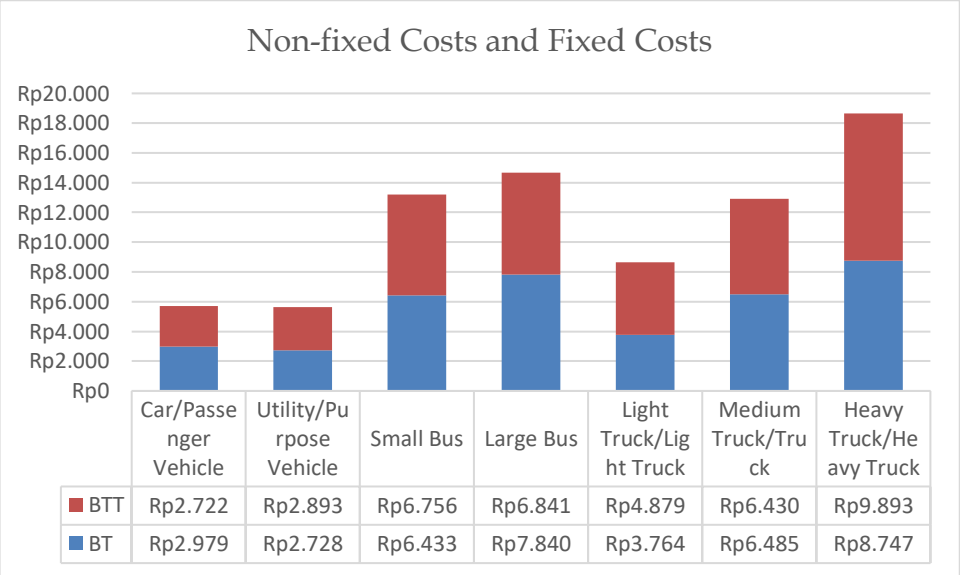
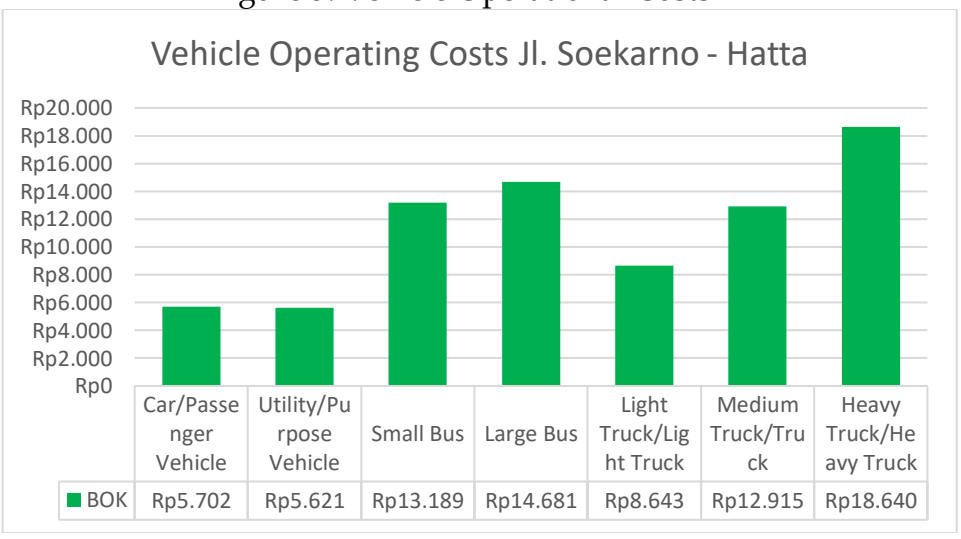


Figure 5. Vehicle Operational Costs



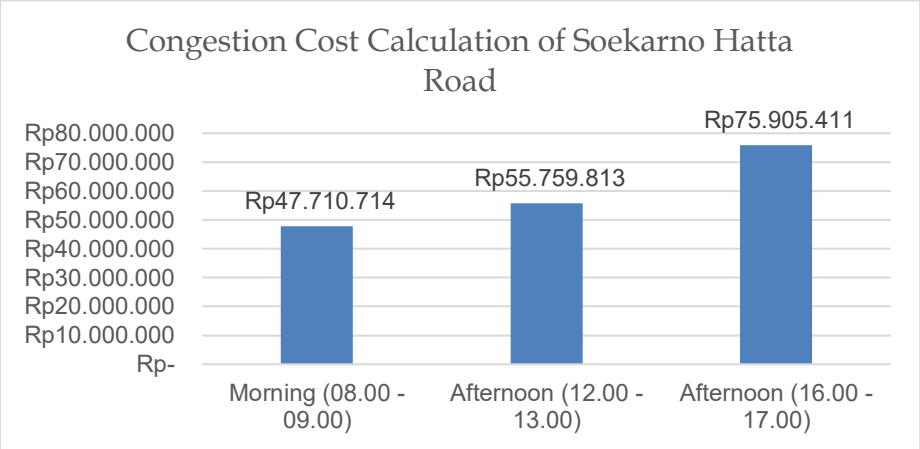
6. Congestion Cost

$$C = N\left[GA + \left(1 - \frac{A}{B}\right)V'\right] T$$

$$= 3019\left[79390{,}54 \text{ x } 46{,}3 + \left(1 - \frac{46{,}3}{50}\right)0{,}0707\right] 0.0004$$

= IDR 47,710,714 / Hour

Figure 6. Congestion Cost Calculation



Based on Figure 6, the highest congestion cost occurs in the afternoon on Soekarno Hatta Road, where the average speed is only 17.8 km/hour. The last step is to analyze the cost efficiency due to congestion through questionnaires that have been distributed to the specified sample, with indicators of travel frequency and continuity of Electronic Road Pricing (ERP) implementation costs. To determine the opportunity for road user shifting as well as the tariff sensitivity of the Electronic Road Pricing (ERP), this analysis is conducted using binary logistic regression in SPSS application, and the results are processed with the SPSS Data Processing formula to determine the chances of road user switching.

Table 4. SPSS Analysis Results

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	FREQUENCY	.943	.616	2.345	1	.126	2.567
	FARE1	4.093	.989	17.113	1	.000	59.918
	FARE2	19.882	14041.630	.000	1	.999	431188290.229
	FARE3	.504	42575.129	.000	1	1.000	1.656
	FARE4	-15.663	40192.962	.000	1	1.000	.000
	Constant	-7.425	2.503	8.802	1	.003	.001

Based on SPSS calculations, the results show that Tariff 1 H2 (Rp.5,000 - Rp.15,000) has a high number of responses, which means that it has a partial effect compared to tariffs 2, 3 and 4. Testing criteria, if the Sig value <0.05 concludes that it has a partial effect.

1. The Travel Frequency variable has a Sig value of 0.126, concluding that Travel Frequency has no partial effect (H1 is rejected).
2. The variable Fare Rp 5,000 - Rp15,000 has a Sig value of 0.000, concluding that the Fare Rp 5,000 - Rp15,000 has a *partial effect (H2 Accepted)*.
3. The variable tariff of IDR 5,000 - IDR 20,000 has a Sig value of 0.999, concluding that the tariff of IDR 5,000 - IDR 20,000 has no partial effect (H3 is rejected).
4. The variable tariff of IDR 5,000 - IDR 25,000 has a Sig value of 1.000, concluding that the tariff of IDR 5,000 - IDR 25,000 has no partial effect (H4 is rejected).

5. The tariff variable of IDR 5,000 - IDR 30,000 has a Sig value of 1.000, concluding that the tariff of IDR 5,000 - IDR 30,000 has no partial effect (H5 is rejected).

Based on the Variables in the Equation table, to determine the estimated probability of road user switching, a statistical approach using binary logistic regression can be used with the general logistic regression model with a significance value of <0.05 as follows:

1. Congestion Cost Efficiency

$$\pi(x) = \frac{\exp^{(\beta 0+\beta 1x)}}{1+\exp^{(\beta 0+\beta 1x)}} = \frac{\exp^{(-7,425+4,093(1))}}{1+\exp^{(-7,425+4,093(1))}} = 0,34$$

$$P(a) = \frac{n(A)}{n(S)} = \frac{48}{100} = 0,48$$

$$n = P(a) \times \pi(x) = 0,48 \times 0,34 = 0,16 = 16\%$$

Figure 7: Congestion Cost Efficiency

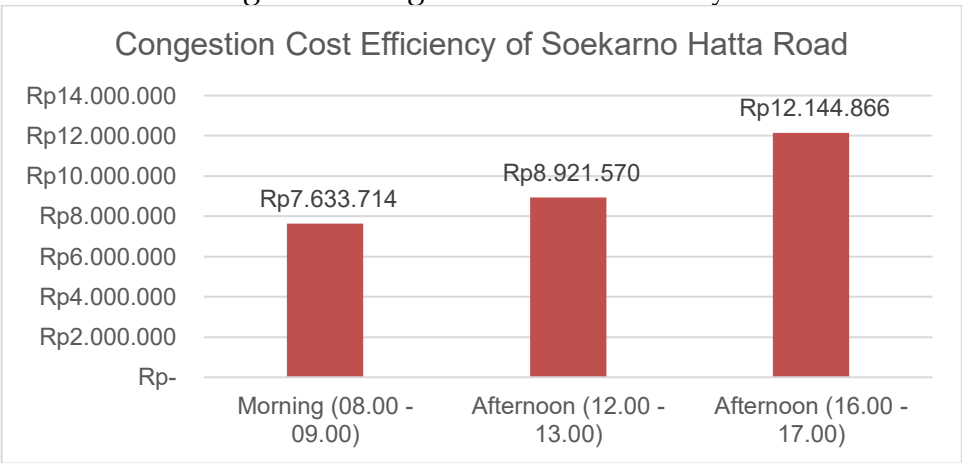
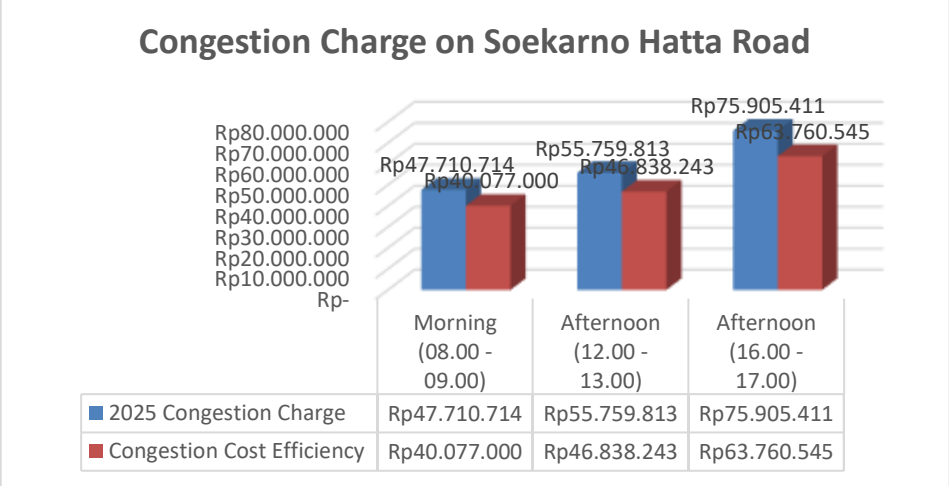


Figure 8: Congestion Cost



Based on the analysis of the traffic study on Jl. Soekarno Hatta (Gedebage Intersection - Cibiru Roundabout) Bandung City, it was found that the Degree of Saturation (DJ) reached high levels in the morning and afternoon, and slightly lower during the day. The LoS (Level of Service) recorded was E in the morning and afternoon, and D in the afternoon, reflecting severe congestion and reduced vehicle speeds. The significant congestion costs indicate an opportunity to improve efficiency through the implementation of Electronic Road Pricing (ERP). Technological infrastructure development, public education, clear regulations, and collaboration between the government and private sector are required for successful and effective Electronic Road Pricing (ERP) implementation.

CONCLUSION AND RECOMMENDATION

Based on the results of the traffic research analysis on Jl. Soekarno Hatta (Gedebage Intersection - Cibiru Roundabout) Bandung City shows that the Degree of Saturation (DJ) reached 0.85 in the morning and afternoon, and 0.75 in the afternoon. The LoS (Level of Service) recorded is E in the morning and afternoon, and D in the afternoon, reflecting the condition of congestion and long queues that cause vehicle speeds to decrease dramatically, even up to 0 km / hr. Based on the calculation of the degree of saturation simulation after the implementation of Electronic Road Pricing (ERP), the value of traffic flow used is 0.48 smp/hour, while the road capacity at the research location is 11011 smp/hour. From the data, the degree of saturation (DS) value is 0.13 in the morning, 0.12 in the afternoon, and 0.14 in the afternoon. which if classified based on the Indonesian Road Capacity Guidelines (PKJI) 2023, is included in category A or very smooth. The resulting congestion costs are Rp 47,710,714 per hour in the morning, Rp 55,759,813 per hour in the afternoon, and Rp 75,905,411 per hour in the afternoon. In addition, the congestion cost efficiency based on road user displacement shows a value of Rp 7,633,714 per hour in the morning, Rp 8,921,570 per hour in the afternoon, and Rp 2,144,866 per hour in the afternoon. There is an opportunity to improve the efficiency of congestion costs by fulfilling various supporting aspects in the implementation of Electronic Road Pricing (ERP) in Bandung City. The implementation of Electronic Road Pricing (ERP) requires the development of strong technological infrastructure, public education, and clear regulations and policies. In addition, close supervision and collaboration between the government, private sector, and related agencies are critical to the success of the system. Evaluation of Electronic Road Pricing (ERP) performance after implementation is also needed to ensure effectiveness and consider social and economic impacts on the community.

ADVANCED RESEARCH

The implementation of Electronic Road Pricing (ERP) in Bandung City needs to focus on the use of advanced technology to ensure the success of the system. In-depth studies on technological infrastructure, such as traffic sensors and artificial intelligence-based applications, are essential to efficiently analyze travel patterns. In addition, public education should be a priority to explain the

benefits of Electronic Road Pricing (ERP) and how technology can improve user experience. Research also needs to explore supportive regulations and policies, as well as effective monitoring mechanisms to prevent abuse. Collaboration between the government, private sector, and relevant agencies should be enhanced to create synergy in ERP implementation. Evaluation of the social and economic impacts of Electronic Road Pricing (ERP) implementation also needs to be conducted periodically to assess the effectiveness of the system and make necessary adjustments for the benefit of society.

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REFERENCES

179-Article Text-686-1-10-20211019 (1). (n.d.).

240-499-1-SM. (n.d.).

Adilah, F., Nadjam, A., Kunci :, K., Kemacetan, B., Lintas, L., Elektronik, J. B., & Perpindahan, P. (2020). POTENSI PENERAPAN SISTEM ELECTRONIC ROAD PRICING (ERP) DI DKI JAKARTA. In *Maret* (Vol. 2, Issue 1).

Akhmad Hermawan, R., & Haryatiningsih, R. (2022a). Dampak Kemacetan di Kota Bandung bagi Pengguna Jalan. *Bandung Conference Series: Economics Studies*, *2*(1). https://doi.org/10.29313/bcses.v2i1.680

Akhmad Hermawan, R., & Haryatiningsih, R. (2022b). Dampak Kemacetan di Kota Bandung bagi Pengguna Jalan. *Bandung Conference Series: Economics Studies*, *2*(1). https://doi.org/10.29313/bcses.v2i1.680

Al'Adilah, Akhmad Hasanuddin, & Willy Kriswardhana. (2021). ANALISIS HUBUNGAN GEOMETRIK JALAN TERHADAP KESELAMATAN JALAN BYPASS MOJOKERTO KM SBY 51-63. *PADURAKSA: Jurnal Teknik Sipil Universitas Warmadewa*, *10*(2), 253–265. https://doi.org/10.22225/pd.10.2.2770.253-265

Amifudin, A. T., & Anggraini, D. Y. (n.d.). *PENGARUH BIAYA TRANSPORTASI, INFLASI, PRODUK DOMESTIK REGIONAL BRUTO TERHADAP EKSPOR NON MIGAS INDONESIA TAHUN 2017-2022*.

Aprillia, K. F., Rochimah, E., & Rochimah, E. (2021). KAJIAN DESAIN LANSKAP KORIDOR JALAN DAGO BERDASARKAN PERSEPSI MASYARAKAT DALAM MENDUKUNG CITY BRANDING KOTA BANDUNG. *Nature: National Academic Journal of Architecture*, *8*(1), 78. https://doi.org/10.24252/nature.v8i1a8

Dewi, T., Badruzzaman, F., Fajar, Y., Suhaedi, D., & Harahap, E. (2020). *SIMULASI KEMACETAN LALU LINTAS PADA LOKASI BUNDARAN BALTOS BANDUNG*. *9*(2).

Hammam, M. N., Achdiat, M., Nurwidya, O., & Novriani, S. (n.d.). *POTENTIAL APPLICATION OF ELECTRONIC ROAD PRICING (ERP) ON ROADS IN BANDUNG CITY*. https://doi.org/10.58344/jws.v3i10.1215

Hamzah, T. S., & Kurniawan, T. (n.d.). FORMULASI KEBIJAKAN PENERAPAN SISTEM ELECTRONIC ROAD PRICING (ERP) PEMERINTAH PROVINSI DKI JAKARTA. *Jurnal Darma Agung*, 221–229. https://doi.org/10.46930/ojsuda.v32i4.4650

Hamzah, T. S., & Kurniawan, T. (2024). FORMULASI KEBIJAKAN PENERAPAN SISTEM ELECTRONIC ROAD PRICING (ERP) PEMERINTAH PROVINSI DKI JAKARTA. *Jurnal Ilmiah Wahana Bhakti Praja*, *14*(1), 73–85. https://doi.org/10.33701/jiwbp.v14i1.4581

Hasibuan, S. S. (n.d.). *PERANCANGAN GEOMETRIK JALAN Tahta Media Group*.

JURNAL MODA TRANSPORTASI DARAT DAN KUALITAS LAYANAN JASA TERHADAP KELANCARAN ARUS CONTAINER DI DEPO. (n.d.).

Litman, T. (2005). London congestion pricing–implications for other cities. *CESifo DICE Report*, *3*(3), 17–21.

Lutfie, S. T. (n.d.). *GEOMETRIK JALAN*.

Nomleni, I. A. (2019). *ANALISIS PENERAPAN ELECTRONIC ROAD PRICING PADA JALAN SUDIRMAN JAKARTA GUNA MENCIPTAKAN TRANSPORTASI YANG BERKELANJUTAN* (Vol. 15, Issue 2).

Novriani, S. (2021). BLACKSPOT IDENTIFICATION USING AEK AND BKA METHODS ON NATIONAL ROAD IN JAVA ISLAND. In *International Journal of Civil Engineering and Infrastructure* (Vol. 1, Issue 2).

Nur Azizah, F., Novriani, S., Budisiswanto, N., & Shefa Salsabila, N. (n.d.). *651 Nazwa Shefa Salsabila Analysis Of Multi Lane Free Flow Implementation At Toll Gates In Indonesia (Case Study Of Cililitan Toll Gate 2)*.

PENERAPAN ILMU MANAJEMEN DAN AKUNTANSI DALAM DUNIA USAHA DUNIA INDUSTRI. (n.d.).

Pramezwary, A., & Hubner, I. B. (2021). *DESAIN PERENCANAAN STRATEGI PENGEMBANGAN POTENSI WISATA KULINER DAN BELANJA KOTA BANDUNG*. *8*(1). http://ejournal.bsi.ac.id/ejurnal/index.php/jp

Pratama, O., Surya Wardana, A., & Fadlurrahman, F. (2022). ANALYSIS OF IMPLEMENTATION PLAN FOR ELECTRONIC ROAD PRICING (ERP) IN TRANSPORTATION SECTOR AT JAKARTA WITH SYSTEM DYNAMICS APPROACH. *JOURNAL OF INFORMATION SYSTEMS AND MANAGEMENT*, *01*(04). https://jisma.org

Ryan Rivaldi, S. N. (2024). *Evaluasi Kinerja Lalu Lintas Terhadap Kapasitas Ruas Jalan Di Kota Bandung (Studi Kasus: Jalan Raya Ujung Berung Kota Bandung)*.

Said, R., Maitimu, A., Talakua, E., Sipil, T., & Ambon, P. N. (n.d.). TINJAUAN BIAYA OPERASIONAL KENDARAAN UMUM TRAYEK MORELLA-BATU MERAH RUTE JMP. *JURNAL SIMETRIK*, *12*(2).

Sudini, L. P. (2021). *MANAJEMEN LALU LINTAS DI JALAN AKASIA GUNA MENGHINDARI KEMACETAN*. *1*(1), 12–19.