Assessing Public Support for Peak-Hour Truck Restrictions on Sepanggar KKIP and Tuaran Bypass: A Road User Survey

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Abstract
This study explored the commuter's opinion on implementation of heavy vehicle restriction during peak hours on Sepanggar KKIP and Tuaran Bypass Road links in Kota Kinabalu, Sabah, Malaysia. The rapid industrialization and tourism growth in Kota Kinabalu has led to significant challenges in traffic management, particularly during peak hours. By employ a structured survey research method, data was collected from 406 respondents between March 22, 2024, and June 16, 2024. Using a convenience sampling technique, the questionnaire was distributed online through social media platforms such as Facebook, Facebook messenger, Telegram, WhatsApp and Instagram. Finding of the study describe sizable majority of respondents (84.5%) recognize heavy vehicle as a primary cause of congestion during peak hours. Especially, 79.5% of participants strongly agree the implementation of heavy vehicle restriction during peak hours, citing potential benefit such as reduce congestion, improve travel time and enhanced road safety. The study future identifies ideal time for restriction. Finding exposes that morning 5.00 AM to 7.00 AM (78.6%) and evening 4.00 PM to 6.00 PM (79.1%), is a most optimal time for this implementation. Outcome of this study emphasize authorities in Sabah for implementing effective peak hour truck restriction that align with public opinion to ensure potential improvement in traffic flow, safety and create of more pleasant and enjoyable driving experiences.

Keywords: Bans; Heavy Vehicle; Sepanggar KKIP' Tuaran Bypass; Peak Hours and Social Media Platforms.

1.0 Introduction
Kota Kinabalu, the capital of Sabah and the sixth largest city in Malaysia, is experiencing rapid growth as East Malaysia's leading coastal center. Its strategic role as an administrative, commercial, industrial, and tourism hub has driven expansion into neighbouring districts. Key road networks, including the Tuaran Bypass and Sepanggar KKIP, connect the city center with surrounding areas such as Tamparuli, Sulaman, Kiulu, Tuaran, and Inanam, facilitating daily commutes for residents and supporting economic activities (Green City Action Plan Kota Kinabalu | BIMP-EAGA, 2019). However, this rapid development has brought significant challenges, particularly heavy traffic congestion during peak hours on these vital road links (Besar et al., 2020; Daily Express, 2022).

The congestion on Tuaran Bypass and Sulaman KKIP has economic implications including wasted time, reduced travel speeds, increased fuel consumption, logistical and supply chain difficulties for businesses, and declining productivity (Lyons et al., 2017; Al Eisaeia et al., 2017). These challenges have encouraged transportation authorities to explore various traffic management strategies aimed at improving traffic flow and safety.

To mitigate these challenges, transportation authorities have explored various traffic management strategies. A common approach is the implementation of heavy vehicle restrictions. These restrictions can take different forms, such as designated lanes for heavy vehicles (space restrictions) or time-based bans during peak hours (Al Eisaeia et al., 2017).

Peak-hour truck bans specifically prohibit heavy vehicles exceeding 7.5 tonnes from accessing main roads during specified times, aiming to reduce congestion and enhance safety by separating heavy vehicles from lighter, more manoeuvrable traffic during busy periods (Road Transport Department Malaysia, 2022; Bernama, 2022). In Malaysia, such restrictions are enforced with penalties including fines up to RM1,000 or imprisonment under the Road Transport Act 1987, and are already applied during festive seasons nationwide to reduce road accidents (Nurazreen & Nurazreen, 2024).

Globally, many cities have adopted similar peak-hour truck bans with varying implementation times and vehicle categories. This regulation implemented in different ways and with different results. The expecting outcome from regulation is to reduce traffic congestions, reduce emission and improve air quality (Chowdhury et al., 2022; Bernard et al., 2020). The following Table 1, show list of some countries and specific cities where such regulation is in place, along with their outcomes:

Table 1: Heavy Vehicle Restriction Implementation and Outcome in Different Geographical Location

No	Country	Restriction time	Vehicles	Outcome	Source
1	Italy	Sunday and public holidays from 7 am to 10 pm during the summer month.	Truck over 7.5 tons	a) The bans have helped reduce traffic congestions during peak hours and tourist seasons. b) Improve travel time for smaller vehicles. c) Enhance road safety.	Stepper, 2023

2	Dubai	i. 6.30am-8.00am ii. 1.00pm-3.00pm iii. 6.30pm-8.300pm	Heavy vehicles weight more than 2.5 tons	a) To improve safety	Potgieter, 2019
3	Mumbai, India	i. 7.00am-11.00am ii. 5.00pm-9.00pm	Heavy goods vehicles	a) Reduce congestions	Alok, 2016
4	Germany	i. Sunday and public holidays from 00.00 am to 10 am.	Truck over 7.5 tons	a) Reducing traffic volume b) Less congestions c) Lower emissions	Stepper, 2023
5	New York City, USA	i. Deliveries only allowed between 7.00p.m. and 6.00 a.m.	Delivery trucks	a) To reduce congestion b) Reduce air pollution	Potgieter, 2019
6	Penang, Malaysia	i. 6.30am-8.30am ii. 5.00pm-7.00pm	Five/six-wheeler lorries, three-axle and four-axle lorries, trailers, and trucks.	a) To reduce congestion b) Accelerating smoother commutes for daily travellers	Vinesh, 2019
7	Kuala Lumpur, Malaysia	i. 6.30am-9.30am ii. 4.30pm-7.30pm	Heavy vehicles exceeding 7.5 tonnes	a) To reduce congestion b) Better travel time for smaller vehicles	Bernama, 2022

These international and local experiences indicate that peak-hour truck restrictions can effectively address traffic congestion, reduce emissions, and improve road safety. However, despite the evident need and potential benefits, public support for such measures in Kota Kinabalu remains unclear. Previous research suggests that while traffic congestion is a significant concern, public backing for peak-hour heavy vehicle bans may be moderate compared to other solutions (Paramasivam et al., 2023). This highlights the necessity for a focused investigation into community perceptions regarding these restrictions on Sepanggar KKIP and Tuaran Bypass.

Therefore, this study aims to fill this knowledge gap by assessing public opinion on peak-hour truck bans in Kota Kinabalu. The findings will provide valuable insights into perceived benefits and optimal implementation timeframes, assisting policymakers in crafting effective and publicly acceptable traffic management strategies that respond to the city's unique growth and transportation challenges.

2.0 Methodology

In this study, a survey research design was employed to effectively gather valuable data on public support for peak-hour truck bans, ultimately contributing to informed policy decisions. This approach allowed the researchers to collect information from a large population swiftly and affordably (Ponto, 2015; Check & Schutt, 2012). A convenience sampling method was used to recruit a sample of 406 respondents. While this method is recognized for its efficiency, particularly in online and social media surveys (Frost, 2021), it is important to acknowledge its limitations. Convenience sampling may not fully represent the diversity of all Sepanggar KKIP and Tuaran Bypass users, potentially leading to sampling bias. To mitigate this limitation, the survey was distributed across a variety of social media platforms, including WhatsApp, Telegram, Facebook, Facebook Messenger, and Instagram, to reach a broader spectrum of users. This approach aimed to capture a more diverse range of demographics and road usage patterns. Additionally, the survey included a screening question to ensure that all respondents were regular users of either the Sepanggar KKIP or Tuaran Bypass roads.

The research instrument for this study consisted of an online questionnaire survey, thoughtfully designed with four sections. Section A collected demographic information from respondents, while Section B focused on how frequently they used both road links. In Section C, the survey gauged road users' support for heavy vehicle bans during peak hours, and the final section explored their suggestions for the most effective timings for these bans. To facilitate participation, the survey was distributed via Google Forms and shared through platforms such as WhatsApp, Telegram, and other social media channels. This approach ensured that responses from the online survey could be swiftly converted into numerical data for analysis, allowing for a seamless transition from feedback to actionable insights.

In this research, descriptive analysis was conducted using SPSS to effectively address the research questions. Frequency tables were employed to summarize and visually present the raw data, allowing for a clear understanding of the patterns and trends within the responses. This analytical approach enhanced the robustness of the findings and provided a solid foundation for drawing meaningful conclusions from the survey results.

3.0 Result and Discussion

This part discusses the result from the survey on public support for peak-hour truck restrictions on Sepanggar KKIP and Tuaran Bypass Road links. This part will analyze the demographics of the participants, their roads usage patterns, and their support for the proposed restriction on heavy vehicles during the peak hour period. Additionally, also discuss the perceived benefits and suitable timing for implementing these restrictions. Therefore, this analysis aims to provide a comprehensive understanding of public opinion, which can help the Sabah State Government, authorities, and other related agencies to develop future traffic management policies.

3.1 Demographics Information

Table 2 shows the findings of the demographics data. As shown in the table below, the survey obtained responses from a various group of road users. Data indicate the gender distribution was fairly balanced, with 47.3 % male and 52.7% female participants, ensuring a comprehensive perspective from both genders. While in age wise, the majority respondents were between 25-54 years old, which constitute 81.7% of the total. This distribution show that the survey primarily reflects the view of working age adults who are likely to be frequent road users. Moreover, occupational data exposed that most respondents were employed in the public sector (53.7%), followed by the private sector (26.4%). Additionally, there were smaller percentage of self-employed individuals (6.9%), retirees (3.2%), unemployed (0.5%) and others (9.1%).

Table 2. Demographics Information

Measure	Frequency	Percentage (%)
Gender		
Male	192	47.3
Female	214	52.7
Total	**406**	**100**
Age		
18-24 years old	42	10.3
25-34 years old	111	27.3
35-44 years old	139	34.2
45-54 years old	82	20.2
55-64 years old	27	6.7
65 years old or above	5	1.2
Total	**406**	**100**
Occupation		
Private sector	107	26.4
Public sector	218	53.7
Self-employee	28	6.9
Retired	13	3.2
Unemployed	2	0.5
Others	37	9.1
Total	**406**	**100**

3.2 Users' Frequency of use on Both Roads' Links

Table 3 data represents the frequency and patterns of road use among respondents. The finding revealed that 27.8 % of participants primarily commuted via Sepanggar KKIP, while 14.3% used Tuaran Bypass. A significant majority 57.9% utilized both roads' networks. Usage frequency shows that 78.8% of respondents travel on this road daily, indicating heavy dependence on both routes. A further 12.1% use the roads several times a week, 1.7% once a week, 4.4% several times a month and 2.7% rarely.

Table 3. User frequency on both roads' links

Measure	Frequency	Percentage (%)
Primary Commute routes		
Sepanggar KKIP	113	27.8
Tuaran Bypas	58	14.3
Both roads' links	235	57.9
Total	**406**	**100**
Frequency use both roads' links		
Daily	320	78.8
Several times a week	49	12.1
Once a week	7	1.7
Several times a month	18	4.4
Rarely	11	2.7
Never	1	0.2
Total	**406**	**100**

3.3 Commuters support for Heavy Vehicle Restriction During Peak Hours

Finding in table 4 exposes a crucial aspect of this survey was evaluating public support for restricting heavy vehicles during peak hours. A significant 84.5 % of the participants of this survey agreed that heavy vehicles are major cause of traffic congestion on both roads' links during the peak hours. This perception is critical on understanding the high level of support for the proposed restrictions.

When questioned about their support for the restriction of heavy vehicles during peak hours, 79.5% of the respondents strongly agreed, and 8.6% agreed. This statistical finding disclosed a strong agreement in support of the measure. Conversely, only a small percentage neither agree or disagree (7.4%), disagreed (1.9%) or strongly disagreed (6.2%).

Respondents also emphasized the potential positive effect of the restriction, with 67% starting it would definitely improve their travel experience, 13.3% indicating it would possibly improve it, and 14.5% suggesting it may improve it. Only a minority thought it might not improve (3%) or would not improve at all (2.2%).

The survey findings also report the respondent's opinion on the perceived benefits of heavy vehicle restrictions during peak hours. The significant 85.5% of respondents believe that such a restriction would reduce traffic congestion and improve travel times. Additionally, 66.5% trust it would reduce the risk of accidents involving heavy vehicles and other road users. From the environmental aspect also noted that 36.0 % believed the restrictions reduce air pollution and emissions due to fewer heavy vehicles during peak hours. Furthermore, benefits from economic view point this restriction would increase productivity and efficiency for businesses due to improved traffic flow. While on other benefits cite were Less stress and frustration associated with traffic congestion (52.7%) and it would creation of a more pleasant and enjoyable environment for all residents and visitors (45.8%). Therefore, these perceived benefits reinforce the strong public support for the proposed restrictions.

Table 4. Commuters Support

Measure	Frequency	Percentage (%)
Does heavy vehicles during peak hours cause traffic congestion on both roads?		
Yes	343	84.5
No	36	8.9
Not sure	27	6.7
Total	**406**	**100**
Do you agree with the restriction on heavy vehicles on both roads during peak hours?		
Strongly agree	308	75.9
Agree	35	8.6
Neither agree or disagree	30	7.4
Disagree	8	1.9
Strongly disagree	25	6.2
Total	**406**	**100**
Would the heavy vehicle restriction during peak hours have a positive effect on your travel experience on those roads?		
Definitely	272	67.0
Possibly	54	13.3
It may be	59	14.5
Possibly not	12	3.0
Not at all	9	2.2
Total	**406**	**100**
Benefits of restriction heavy vehicles on those roads during peak hours.		
Reduced Traffic Congestion and Improved Travel Times	346	85.5
Reduced risk of accidents involving heavy vehicles and other road users	270	66.5

Reduced air pollution and emissions due to fewer heavy vehicles during peak hours	146	36
Increased productivity and efficiency for businesses due to improved traffic flow	144	35.5
Less stress and frustration associated with traffic congestion	214	52.7
Creation of a more pleasant and enjoyable environment for all residents and visitors	186	45.8

3.4 Gender Differences in Support for Peak-Hour Truck Bans

Table 5 present cross-tabulation analysis between gender and support for peak-hour truck bans on Sepanggar KKIP and Tuaran Bypass reveals a high level of support among both male and female respondents. Specifically, 88% of males (169 out of 192) and 91.6% of females (196 out of 214) either "strongly agree" or "agree" with the implementation of these restrictions. Notably, female respondents demonstrate slightly higher overall support, with a greater proportion selecting "strongly agree" and fewer expressing disagreement compared to their male counterparts. Neutral and negative responses are low across both genders, indicating a broad consensus in favor of the policy.

These findings suggest that gender does not significantly influence the overall strong support for truck restrictions during peak hours on these critical road links. The consistent support across both male and female respondents reinforces the policy's broad-based acceptance among the commuting public in Kota Kinabalu.

Table 5. Gender Differences in Support for Peak-Hour Truck Bans

Gender	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Male	22	147	14	4	5	192
Female	32	164	15	2	1	214
Total	**54**	**311**	**29**	**6**	**6**	**406**

3.5 Restriction Times for Heavy Vehicles on Both Roads' Links

Table 6 revealed respondents' opinions on ideal times for implementing heavy vehicle restrictions. Results explains that the most challenging periods for heavy vehicles traffic congestion are the morning peak hours of 5.00 AM to 7.00 AM (78.6%) and the evening peak hour of 4.00 PM to 6.00 PM (79.1%). These timeframes, which clash with typical commuter traffic, suggest that implementing restrictions on heavy vehicles during these periods could potentially mitigate congestion and improve overall traffic flow in both road links.

Table 6. Restriction Time

Measure	Frequency	Percentage (%)
What is the best time to restrict heavy vehicles in the morning?		
5.00 AM – 7.00 AM	319	78.6
7.00 AM – 9.00 AM	75	18.5
Others	12	2.9
Total	**406**	**100**
What is the best time to restrict heavy vehicles in the evening?		
4.00 PM – 6.00 PM	321	79.1
6.00 PM – 8.00 PM	49	12.1
Others	36	8.9
Total	**406**	**100**

4.0 Conclusion

The outcome of this study provides useful information that can guide traffic policymakers in Sabah state government and related traffic management authorities. By aligning these restrictions with strong public support, policymakers can develop targeted strategies grounded in reliable data that accurately reflect commuters' preferences. This data-driven approach ensures that decisions are well-informed and effective in addressing traffic concerns.

Subsequently the significant public backing for truck bans during specific peak periods, the study encourages immediate policy action. Authorities are urged to implement time-based heavy vehicle restrictions on both road links. To maximize compliance and achieve the intended benefits of reducing congestion and enhancing road safety, these measures should be accompanied by clear public communication, effective signage, and strict enforcement. Furthermore, the immediate policy actions given the great support for truck bans during specific peak periods, authorities are encouraged to move forward with implementing time-based heavy vehicle restrictions on both road links. This should be accompanied by clear public communication, effective signage, and strict enforcement to maximize compliance and achieve intended congestion and safety benefits. Beyond standalone truck bans, the findings highlight the value of integrating such restrictions with broader urban mobility strategies. Policymakers should consider complementary measures, such as improving public transportation, upgrading road infrastructure, incentivizing carpooling, and deploying smart traffic management systems, to create a holistic and sustainable solution to congestion.

Finally, the study establishes a baseline for future impact assessments. Policymakers are advised to monitor and evaluate the real-world effects of implemented truck bans, including changes in traffic flow, road safety, business logistics, and public satisfaction. Such an ongoing evaluation will ensure that policies remain effective and can be adjusted as needed.

Moving forward, the combination of immediate policy action and a strong commitment to ongoing evaluation and refinement will enable Sabah to make significant progress toward more efficient, safer, and sustainable urban mobility. It is essential that authorities not only implement these restrictions but also continuously monitor their effectiveness to assessing impacts on traffic flow, safety, business operations, and public satisfaction. In future study should continue to evaluate these measures in practice, ensuring that policies remain responsive to the evolving needs of the community.

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Author Contributions

A. Paramasivam: Abstract, Introduction**,** Methodology, Results and Discussion; **A. Awang Jual**: Literature Review, Implication, data analysis and Conclusion; **E.Aruchunan** Editing. Validation, Review & Editing, Supervision.

Conflicts Of Interest

The manuscript has not been published elsewhere and is not under consideration by other journals. All authors have approved the review, agree with its Submission, and declare no conflict of interest in the manuscript.

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