

DOMESTIC TOURIST TRAVEL PATTERN SHIFTS TO LAKE TOBA POST-OPERATION OF TEBING TINGGI – SINAKSAK TOLL ROAD

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Article Info	Abstract
Keywords: Travel Pattern, Accessibility, Lake Toba Received: July 02, 2026 Approved: September 16, 2026 Published: September 30, 2026	This research is motivated by the designation of Lake Toba as a Super Priority Tourism Destination (DPSP), which demands significant improvements in accessibility. The operation of the Tebing Tinggi – Sinaksak toll road segment acts as a game changer, cutting travel time from Medan to the gateway of Lake Toba, which previously took 4-5 hours, to be much more efficient. The objective of this study is to analyze the shifts in domestic tourist travel patterns before and after the toll road's operation and to formulate adaptation strategies for tourism businesses in the affected areas. The study utilizes transport geography theories, specifically the space-time compression phenomenon and the concept of generalized cost in route selection. The method employed is mix-method, with data collection techniques involving interviews, field observations and 60 questionnaires were distributed to tourist. The results are expected to provide recommendations for the government and stakeholders in mitigating economic impacts on the old arterial routes and optimizing tourism services in Parapat and Samosir island lake toba.

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INTRODUCTION

Tourism is a strategic sector that contributes significantly to national economic development, both through foreign exchange earnings and employment generation. In the National Medium-Term Development Plan (RPJMN), the Government of Indonesia designated Lake Toba as one of the five Super Priority Tourism Destinations (DPSP). The development of this region focuses not only on tourist attractions but also on accessibility aspects (Kemenparekraf, 2021). Accessibility is a vital component within the tourism system, as the ease of reaching a destination is directly proportional to tourists' motivation and visitation decisions (Tamin, 2000).

The accessibility of domestic tourists from the city of Medan and Kualanamu International Airport to the Parapat and Samosir Island areas relied heavily on the Trans-Sumatran National Highway network. This arterial pathway frequently faced constraints due to high traffic volumes, particularly on the Medan–Tebing Tinggi–Pematang Siantar segment. Recurrent congestion in the "Pasar Bengkel" area and density within the Tebing Tinggi city center resulted in inefficient travel times, often exceeding 4 to 5 hours of overland travel. This condition created psychological and physical barriers for tourists, affecting their revisit intention or limiting their visit durations solely to long holiday seasons (Damanik & Weber, 2006).

In an effort to improve connectivity the government through the Trans-Sumatran Toll Road (JTTS) project, has operationalized the Kuala Tanjung–Tebing Tinggi–Parapat (Kutepat) toll road section. Specifically, the functional and operational opening of the Sinaksak toll gate has served as a game changer for mobility toward Lake Toba. The operation of the Tebing Tinggi–Sinaksak segment allows motorists to bypass chronic congestion on the Tebing Tinggi arterial route and surrounding plantation areas, significantly reducing travel time to Pematang Siantar, which serves as the primary gateway to Parapat (Badan Pengatur Jalan Tol [BPJT], 2024).

Theoretically changes in transportation infrastructure trigger a shift in travel patterns and tourists' spatial behavior. According to Rodrigue (2020), improvements in accessibility can induce the phenomenon of space-time compression, whereby physical distance is perceived as closer due to shorter travel times. In the context of tourism toward Parapat and Samosir, this has the potential to alter travel characteristics, such as increasing the frequency of short-term visits (weekend getaways), shifting departure times, and introducing greater flexibility in selecting ferry crossings to Samosir due to more precise arrival estimations. The presence of this toll road also has the potential to alter stopover patterns that have historically sustained the local economy along the old arterial road. Tourists may no longer stop at souvenir centers or restaurants along the Tebing Tinggi–Serdang Bedagai route, as they opt for the direct pathway via the toll road.

Sinaga et al. (2021) highlighted the importance of accessibility in influencing tourists' intention to revisit the Lake Toba area, particularly in relation to road conditions and transportation connectivity. Similarly, Pratama (2020) demonstrated that improved accessibility through toll road development could alter tourists' travel patterns, including a shift from transit tourism to destination-oriented travel. In the Lake Toba region, Sembiring and Nasution (2022) emphasized the importance of integrating road transportation with ferry services, while Putra (2023) identified the potential economic impacts of reduced tourist stopovers along former arterial routes following the operation of toll roads. That Few

empirical studies have mapped how this pattern shift occurs specifically within the segment of domestic tourists traveling to Parapat and Samosir following the opening of the Sinaksak toll gate. Given this phenomenon, research analyzing shifts in travel patterns is critical. A profound understanding of route changes, time management, and travel preferences is vital for mitigating impacts on business operators along the old route and for developing new tour package strategies in the Lake Toba region. This study aims to analyze travel patterns before and after the toll road operation and to formulate adaptation strategies for tourism business operators.

METHODS

This study adopts a mixed-methods approach with a sequential explanatory design strategy (Creswell, 2018). The first phase focuses on quantitative data collection and analysis to statistically map the significance of travel pattern changes following the operation of the Sinaksak Toll Road. The second phase involves the collection and analysis of qualitative data to explore in-depth the managerial responses and adaptation strategies implemented by tourism business operators in response to these changes.

The research location encompasses the travel corridor from Medan to Parapat (Simalungun Regency) and Samosir Island (Samosir Regency), including the affected areas along the old arterial route (Serdang Bedagai and Tebing Tinggi). Field data collection was conducted over a two-month period, from February to March 2026.

The population for the quantitative data comprises all domestic tourists using private vehicles who visited Parapat and Samosir, categorized as an infinite population whose exact size is unknown. The research sample was established at 60 domestic tourist respondents, determined via the accidental sampling technique using the Lemeshow formula (Riduwan, 2015). Quantitative data collection was executed by distributing structured questionnaires measuring route choices, travel durations, visit frequencies, and stopover locations. Meanwhile, the qualitative sample was selected via purposive sampling, consisting of key tourism business informants, including owners of restaurants and souvenir centers along the old arterial route, accommodation managers in Parapat and Samosir, and transport or ferry port authorities in Ajibata.

Quantitative data analysis techniques utilize descriptive statistics, including percentages and frequency distributions, to visually depict travel pattern shifts. Qualitative data are analyzed following the interactive model of Miles and Huberman (2014), which encompasses three main stages: (1) data reduction, involving the selection and simplification of business strategy data from interview transcripts; (2) data display, by organizing information into comparative matrices and narratives; and (3) conclusion drawing and verification, to formulate valid adaptation strategies. The validity of the qualitative data was tested using source and method triangulation techniques to ensure the credibility of the field findings.

RESULT AND DISCUSSION

Domestic Tourist Travel Patterns Prior to Toll Road Operation

Prior to the operation of the Tebing Tinggi–Sinaksak toll road segment, domestic tourist mobility from Medan to Parapat and Samosir relied heavily on the national arterial road

network, particularly the Trans-Sumatra National Highway. Based on the questionnaire data collected from 60 domestic tourists and the qualitative findings, travel patterns during this period were characterized by relatively long and uncertain travel times, longer planned stays, and greater dependence on the arterial road for both mobility and stopover activities.

1. Travel Duration and Uncertainty

Travel via the old arterial route was characterized by considerable uncertainty due to recurring congestion at several bottlenecks, particularly the Pasar Bengkel area and the central intersection of Tebing Tinggi. The reported travel duration from Medan to Parapat generally ranged from 4 to 5.5 hours. The variation in travel duration indicates that congestion was an important factor affecting tourists' travel planning and arrival-time predictability.

2. Length of Stay

The relatively long and uncertain travel duration encouraged tourists to plan their visits around official holidays and long weekends. The travel pattern was therefore predominantly associated with longer visits, with a minimum stay of approximately 2–3 days. This condition suggests that the journey itself constituted an important consideration in determining the duration and timing of tourist visits.

3. Travel Cost and Fuel Expenditure

Before the operation of the Sinaksak toll road, tourists generally incurred fuel expenditure within the range of approximately IDR 150,000–200,000, while 23.1% of respondents reported no toll expenditure because they did not use a toll road. The relatively high fuel expenditure was associated with prolonged travel and stop-and-go conditions along the congested arterial route.

Tourist Travel Patterns after Toll Road Operation

The operation of the Tebing Tinggi–Sinaksak toll road produced a substantial change in the travel patterns of domestic tourists. Analysis of the questionnaire responses from 60 tourists travelling by private vehicle indicates a shift toward faster and more direct travel, accompanied by changes in stopover behavior and the temporal organization of visits.

1. Main Route Diversion

After the toll road became operational, 67.9% of respondents reported using the full toll road route and exiting at the Sinaksak Toll Gate. This indicates a clear shift away from the previous reliance on the Trans-Sumatra arterial route toward a more direct toll-based route.

2. Travel Time Efficiency

The shift in route was associated with a reduction in travel duration of approximately 1–1.5 hours, with the current journey from Medan to Parapat generally taking approximately 3–3.5 hours. This finding is consistent with the concept of space-time compression, whereby improved transport infrastructure reduces the perceived temporal distance between the origin and destination.

3. Emergence of One-Day Trips

Improved accessibility has also been accompanied by the emergence of short-term, non-overnight visits. One-Day Trips accounted for 16.1% of tourist visits. The shorter

travel duration provides tourists with greater flexibility to visit attractions in Parapat and the outer areas of Samosir and return to Medan on the same day.

4. Changes in Stopover Locations

The reduction in travel time has also altered tourists' stopover preferences. 37.5% of respondents preferred official rest areas along the toll road for resting and purchasing snacks. This shift potentially reduces the role of the Serdang Bedagai and Tebing Tinggi urban areas as traditional transit and culinary stopover locations. Consequently, businesses that previously depended heavily on passing tourists may need to develop alternative strategies to attract customers.

5. Intermodal Connectivity

Despite the improvement in road accessibility, travel to Samosir remains dependent on ferry schedules at Ajibata and Tigaras ports. The questionnaire data indicate that 57.1% of tourists preferred morning ferry departures between 07:00 and 11:00 WIB to maximize their time at the destination. The shorter road travel time may also result in tourists arriving at the ferry terminals earlier, potentially creating temporary concentrations of vehicles before ferry departures.

Comparative Travel Cost and Fuel Considerations

The benefits of the toll road should be interpreted not only in terms of travel-time savings but also in relation to additional toll expenditure and potential fuel savings. Before the operation of the Sinaksak segment, respondents generally spent approximately IDR 150,000–200,000 on fuel, while toll expenditure was relatively limited because the longer toll access had not yet been operational.

After the operation of the Tebing Tinggi–Sinaksak segment, tourists incur an additional toll fee, but the report currently does not provide the actual toll tariff paid by the respondents or a measured amount of fuel saved per trip. Therefore, it would be inappropriate to claim a specific monetary saving or fuel saving based solely on the existing data. The findings can instead be interpreted as a time–cost trade-off: tourists pay an additional toll charge in exchange for a reduction of approximately 1–1.5 hours in travel time and more predictable journey conditions. To strengthen this analysis, the study should report the applicable toll tariff for the route used by the respondents and, if available, compare fuel consumption before and after the toll road operation. This would allow a more precise assessment of the relative advantages and disadvantages of toll-road use.

Table 1. comparative quantitative overview

Travel Indicators	Prior to Sinaksak Toll Road Operation	Post-Sinaksak Toll Road Operation
Primary Route Choice	National Arterial Route (Trans-Sumatra Highway)	Full Toll Road Route (Exiting Sinaksak Gate): 67.9%
Travel Time Duration	Unstable due to congestion, ranging from 4 – 5.5 hours	Stable and efficient, ranging from 3 – 3.5 hours (Time savings of 1 – 1.5 hours)
Visitation Characteristics	Planned, long-term, minimum length of stay of 2 – 3 days	Emergence of a short-term, non-overnight trip trend (One-Day Trips): 16.1%

Stopover Locations	Serdang Bedagai Town Center and Tebing Tinggi Culinary Center	Official Rest Area facilities along the toll road route: 37.5%
Intermodal Connectivity	Irregular and scattered arrivals following arterial road bottleneck fluctuations	Concentration of vehicle arrivals at the ferry port in the morning (07:00–11:00 WIB): 57.1%

Source : Primary Data, 2026

Adaptation Strategies of Tourism Operators in Impacted Areas

Shifts in travel patterns and modifications in spatial behavior exert a dichotomous economic impact that necessitates profound managerial responses from tourism business operators. Through a qualitative approach utilizing in-depth interview results, specific adaptation strategies implemented by tourism business groups in the affected areas were formulated:

Adaptation Strategies of Business Operators in Destination Areas (Parapat and Samosir)

The acceleration of tourist arrival times due to toll road efficiency is positively received by destination business operators through service operational flexibility strategies:

- 1. Complimentary Early Check-In Policies**

To accommodate tourist groups using private vehicles who arrive at accommodations much earlier than standard hotel check-in hours, accommodation operators (hotels and homestays) apply flexible early check-in policies without charging penalty fees or additional costs to guests.

- 2. Extension of Service Operational Hours**

Restaurant operators and managers of tourist attractions in the Parapat area opt to extend their daily operational hours into the late evening. This policy is aimed at capturing the market potential of the One-Day Trip tourist segment, who remain active in tourist activities until nightfall before returning to their cities of origin.

Adaptation Strategies of Business Operators Along the Old Arterial Route (Land Transit)

The opening of the toll road triggers a massive "tunnel effect" that is economically detrimental to culinary, handicraft, and souvenir center operators along the Serdang Bedagai and Tebing Tinggi arterial routes, as they are bypassed by toll traffic. As a form of survival strategy, these land transit business operators implemented the following critical measures:

- 1. Target Market Diversification Toward Non-Transit Markets**

Business operators shifted their marketing focus from long-distance transit tourists to local non-transit markets from neighboring regencies or cities. This strategy is executed through organizing community events and providing family-friendly dining or retail outlets.

- 2. Optimization of Active Digital Marketing**

To overcome the decline in physical vehicle visitations along the roadside, business operators have begun utilizing social media and digital platforms to promote their signature souvenir products. They provide direct shipping services to major cities,

ensuring that sales transactions no longer fully depend on the physical presence of consumers at the outlets.

3. Internal Operational Structure Efficiency

As a rational step toward financial stabilization amidst a significant decline in sales turnover, business owners have restructured cost management. These adjustments include stricter reallocation of employee working hours and a reduction in daily culinary production volumes to mitigate operational waste.

CONCLUSION

The opening of the Tebing Tinggi–Sinaksak toll road has significantly transformed the travel patterns and spatial behavior of domestic tourists traveling from Medan to the Lake Toba National Tourism Strategic Area (Parapat and Samosir). A major route shift is evident, with 67.9% of tourists now choosing the full toll path. This transition saves 1 to 1.5 hours of travel time and has triggered a notable trend toward one-day trips (16.1%). Furthermore, stopover preferences have shifted from traditional arterial roads to toll rest areas (37.5%), creating a "tunnel effect" that economically challenges businesses along the old route. Regarding intermodal connectivity, a strong reliance on ferry schedules has concentrated 57.1% of tourist arrivals in the morning.

To address these shifts, this study offers several policy and practical recommendations. First, local governments should collaborate with Toll Road Business Entities (BUJT) to support displaced MSMEs by providing them with dedicated commercial spaces inside toll rest areas. Second, PT ASDP Indonesia Ferry needs to synchronize schedules and increase ferry trip frequencies during peak morning hours to relieve the vehicle congestion caused by toll-induced time compression. Finally, destination-based businesses should enhance service flexibility by offering early check-ins, while operators along the old arterial route must optimize digital marketing and diversify their products to target non-transit markets.

The primary limitation of this research is its exclusive focus on domestic tourists using private vehicles within a short-term evaluation framework. Therefore, future studies should expand this scope to include international tourists and employ multi-year longitudinal analyses. This will provide a clearer understanding of the long-term macroeconomic impacts on the sustainability of overland transit regions in North Sumatra.

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