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Public Discourse on Toll Road Services During the Eid Homecoming: A Topic Modelling and Agenda Rippling Analysis

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Abstract

This study examines the digital discourse regarding toll road services during the 2025 Eid homecoming using Topic Modeling with the Latent Dirichlet Allocation (LDA) method, grounded in the Reverse Agenda-Setting theory and the concept of Agenda Rippling. Data were collected from conversations on the social media platform X (Twitter) during the period from seven days before to seven days after Eid (March 24-April 8, 2025). The analysis identified three main issues: direct user experiences related to traffic conditions, driving behavior, and accidents (Topic 6); official communications from relevant authorities such as the Police and Jasa Marga (Topic 8); and public disappointment due to the gap between expectations and the actual quality of toll road services (Topic 3). This study employs Reverse Agenda-Setting Theory and the concept of Agenda Rippling to explain how public opinion can reshape the direction of media communication. The findings highlight the importance of monitoring digital public discourse to address the informational needs and aspirations of society, particularly in strategic moments such as the Eid homecoming season.

***Keywords**: Topic Modeling; LDA; Reverse Agenda-Setting; Agenda Rippling; Toll Road*

1. Introduction

The annual Eid al-Fitr (Lebaran) homecoming celebration in Indonesia, known as the "mudik", is carefully integrated into the nation's cultural and religious identity, especially among its predominantly Muslim populace. This tradition entails millions returning to their native towns to commemorate with family, exemplifying principles of kinship, solidarity, and communal delight (Iriany et al., 2019; Suartika et al., 2024). The mudik period, acknowledged as one of the most significant annual human

migrations worldwide, often lasts 14 days, commencing seven days before (H-7) and concluding seven days subsequent (H+7) to Eid, with travel itineraries frequently coordinated with governmental or employer holiday schedules (Radiansyah et al., 2024; Hendrawan, 2020). In 2025, over 146.48 million individuals, exceeding half of the national population, engaged in this mass travel, with Central Java, East Java, and West Java identified as the primary destinations (Ministry of Transportation's transportation policy agency, 2025).

Land-based transportation predominates mudik travel, with private automobiles, buses, and motorcycles comprising the majority of journeys. The increase in vehicle traffic exerts significant strain on Indonesia's road infrastructure, particularly toll highways operated by state-owned firms such as PT Jasa Marga (Persero) Tbk. In the 2025 migration, Jasa Marga anticipated that more than 2.18 million vehicles would leave Jakarta through major toll gates, substantially surpassing the typical traffic capacity (Bahfein & Alexander, 2025). Historical data and recent occurrences highlight persistent issues: significant congestion on key routes, including the Jakarta-Cikampek and Cipali toll roads, bottlenecks at junctions, and notorious incidents such as the 2016 "Brebes Exit" tragedy, which transformed a three-hour trip into a 35-hour ordeal with deadly outcomes (Evanita et al., 2016; Nurcahayati et al., 2023; CNN Indonesia, 2024a). Another example, in 2024, several congestion points drew significant public attention. For instance, travelers stuck at KM 94 of the Tangerang-Merak Toll Road, which connects to Merak Port, could only move about 2 kilometers in 7.5 hours (Saputra, 2024). Despite the extensive documentation of mudik as a socio-cultural and infrastructural phenomenon, existing studies rarely examine how public narratives about toll-road failures evolve within digital communication environments, particularly in the early stages of agenda formation.

The challenges are exacerbated by operational limitations at toll gates, insufficient rest area capacity, and environmental disturbances. Inadequate balances on electronic toll cards often impede transaction speeds, diminishing throughput from five to merely one vehicle per minute at high-traffic sites such as Kalikangkung (Ramadan, 2024; Kencana, 2024). Rest facilities, essential for long-distance travelers, frequently become congested when demand exceeds capacity, resulting in illegal roadside stops and highway obstructions (Laskara, 2021; Maharani & Alexander, 2024; Radiansyah et al., 2024). Natural hazards exacerbate mobility issues: landslides on the Bocimi Toll Road, flooding on the Sedyatmo and Cipali toll sections, and extreme weather events have consistently interrupted mudik flows (Widadio, 2024; Dananjaya & Ferdian, 2024; Baihaqi, 2024).

Regrettably, these circumstances also lead to increased accident rates; the 2024 period recorded 213 traffic incidents, encompassing multi-fatality collisions on contraflow lanes and perilous segments such as KM 370 of the Batang-Semarang Toll Road (CNN Indonesia, 2024b; Pusparisa, 2024; Gideon, 2024; Darmawan, 2024).

The public dialogue regarding these concerns has progressively transitioned to digital platforms. Indonesia boasts 212 million internet users and 143 million active social media participants, mostly on Twitter (X) and Instagram, rendering online platforms essential for real-time reporting and critique (Pau, 2025). In the 2024 mudik, problems such as toll gate delays, contraflow mismanagement, and fatal accidents initially emerged through viral posts by individuals and influencers, and were then magnified by mainstream media. This pattern illustrates the reverse agenda-setting dynamic, in which public mood on social media influences traditional media coverage rather than the contrary (Luo & Harrison, 2019; Chong, 2019; Humeira & Ramadhan, 2022). The process occurs via agenda rippling, when initial user-generated narratives proliferate online, subsequently disseminating throughout digital media and ultimately being adopted by traditional news organizations (Kim & Lee, 2006; Boling et al., 2025; Russell Neuman et al., 2014; Bhuvana & Aram, 2019; Fotova Čiković et al., 2023). While previous research has focused on traffic engineering, congestion modeling, and infrastructure performance during mudik, little is known about how these operational failures are perceived, narrated, and amplified by digital publics, nor how these narratives subsequently influence media agendas.

In light of this expanding media environment, comprehending the emergence and escalation of toll road service concerns during mudik necessitates an analysis of both infrastructural and policy failures, as well as the communicative function of digital publics. Entrepreneurs, including netizens, activists, and influencers, utilize platforms such as X to highlight systemic issues, converting personal frustrations into national dialogues (Wibowo & Karlinah, 2018; Jiang & Fu, 2018; Feezell et al., 2021). Consequently, the research question, what concerns arise concerning toll road services during the 2025 Eid homecoming period, must be contextualized within the dual framework of physical mass movement and digital agenda formation dynamics. This study examines social media discourse as both a symptom and a driver of public concern, thereby enhancing a more responsive and participatory style of transportation governance in Indonesia. Research on reverse agenda-setting and agenda rippling in Indonesia has predominantly examined political communication, electoral discourse, or influencer-led issues. There is a

lack of studies applying agenda-rippling theory to non-political public service contexts, such as transportation management during national mobility crises. Consequently, the mechanisms of bottom-up issue diffusion in large-scale social events like mudik remain undertheorized.

2. Method

This research utilizes a computational social science methodology alongside qualitative interpretive analysis. The research is based on a pragmatic orientation instead of a solely constructivist paradigm, facilitating the integration of computational text analytics with contextual qualitative interpretation to comprehend the emergence and circulation of public concerns in digital contexts. The pragmatic paradigm is appropriate for research utilizing digital trace data, since it prioritizes methodological flexibility and the incorporation of diverse types of evidence to tackle intricate communication problems (Creswell & Plano Clark, 2018). This research employs a pragmatist approach to integrate large-scale text modeling with a theory-driven analysis of meaning production in the agenda rippling process.

2.1. Research Design

A sequential explanatory mixed-methods methodology was employed, wherein a quantitative computational analysis (*LDA topic modeling*) serves as the primary phase, succeeded by a qualitative interpretation phase that contextualizes the subjects within the Reverse Agenda-Setting and agenda rippling framework (Srivastava & Sahami, 2009). This framework enables the research to:

(1). detect dominant patterns in a large corpus of social media data; and
(2). interpret these patterns as part of meaning-making processes in digital public discourse.

2.2. Data Collection

Twitter (X) was chosen for its immediacy, strong news relevance, and its recognized application in research on issue salience and agenda dynamics. Moreover, X users were seemingly original people (lesser bot usage) for daily updates of their routines. Data were gathered employing a keyword and variation expansion technique to guarantee thorough retrieval. A preliminary search was performed to uncover pertinent vocabulary variations frequently employed during the Eid homecoming period. The subsequent query phrases were utilized based on this pilot test:

(1). “jalan tol mudik”, “macet tol”, “arus mudik”,
(2). “KM” + angka (e.g., “KM 87”, “KM 152”),
(3). “arus balik”, “one way”, “contraflow”,

(4). “rest area tol”, “saldo e-toll”.

Tweets were gathered from March 24 to April 8, 2025 (H-7 to H+7), representing the officially recognised homecoming and return-flow period. The dataset includes original tweets, replies, quotes, and retweets that contain substantive textual commentary. Automated bot-like posts, promotional content, and duplicated entries were removed at the preprocessing stage. Next, ethical considerations were applied by analysing only publicly available tweets without attempting to identify individual users. All examples included in the analysis were paraphrased to maintain anonymity.

2.3. Data Preprocessing

To guarantee the dependability of the computational analysis, the dataset underwent an extensive text pretreatment workflow. The method commenced with case folding, wherein all characters were transformed to lowercase to ensure uniformity throughout the corpus. Different types of textual noise, such as URLs, hashtags, user mentions, emoticons, numerals, and superfluous punctuation, were methodically eliminated to avoid non-semantic components disrupting the modelling process. Colloquial Indonesian terms frequently employed on Twitter were then standardized into their formal equivalents (for instance, gue to saya, lo to kamu, and bgt to banget), enabling the model to identify theme patterns with greater precision despite linguistic heterogeneity in user-generated content.

In the subsequent phase, word forms were standardized via lemmatization and stemming employing the Indonesian Sastrawi stemmer to diminish morphological variances to their root forms. Stopwords were eliminated utilizing a comprehensive list of generic Indonesian stopwords alongside a customized set specifically designed for the Eid homecoming context. The latter encompassed excessively frequent yet analytically trivial terms, such as “tol,” “jalan,” and “mudik,” which, if preserved, may obscure more significant lexical attributes and result in topic dilution. Language filtering was subsequently implemented to preserve just Indonesian-language tweets, hence maintaining the semantic integrity of the dataset. Ultimately, token filtering was executed by establishing a minimum frequency threshold to exclude exceedingly unusual terms that could generate noise or destabilize the LDA algorithm.

The multi-stage preprocessing technique refined the dataset into a clean and analytically robust corpus of 5,006 tweets, which served as the foundation for the topic modelling study.

2.4. Topic Modelling (LDA)

Latent Dirichlet Allocation (LDA) was employed to uncover latent thematic structures within the corpus, given its effectiveness for analysing large volumes of unstructured text (Chen et al., 2016). To identify the most stable and interpretable model, several candidate topic configurations ranging from two to twenty topics were tested. Model performance was assessed using the *c_v coherence metric*, which evaluates the semantic consistency of topics. The parameter settings applied during model optimisation included a symmetric alpha prior, a beta value of 0.01, a minimum document frequency threshold of 10, and a training procedure consisting of 500 iterations across 20 passes. These parameters were selected to balance the need for computational stability with the preservation of meaningful variance within the dataset. Based on coherence scores and thematic interpretability, the model comprising nine topics was identified as optimal. This configuration produced clearly differentiated topic clusters without fragmentation, providing a coherent representation of the dominant issues discussed by users during the Eid homecoming period.

2.5. Qualitative Interpretation and Validation

Subsequent to the quantitative modelling phase, all nine themes underwent qualitative interpretation to contextualize and enhance the computational results. The top twenty representative tweets for each topic, characterized by the highest topic probability, were extracted for detailed analysis. To improve interpretative reliability, two independent coders evaluated and designated thematic labels to each topic. Intercoder reliability was evaluated using Cohen's Kappa, resulting in a coefficient of $\kappa = 0.78$, signifying substantial agreement upon reconciliation. This validation approach guarantees that topic labels were not randomly or individually assigned but instead based on a clear and reproducible interpretive method. All tweet examples utilized in the interpretation were rephrased to safeguard user identity while preserving the semantic integrity essential for precise thematic analysis. This systematic method mitigates prevalent criticisms of LDA about subjectivity in topic labelling, hence enhancing the legitimacy of the results.

2.6. Theoretical Interpretation

Once the topics were validated, they were interpreted through the lens of Reverse Agenda-Setting, with particular attention to the concept of agenda rippling as articulated by Kim and Lee (2006). This stage examined the communicative processes through which individual user experiences posted on Twitter evolved into broader issue streams. The analysis focused on three dynamics:

(1). The ways in which personal accounts and situational updates expanded into wider conversations across the platform,
(2). the degree to which spontaneous public reports were amplified by institutional actors, media outlets, or high-visibility accounts, and
(3). The interaction between bottom-up issue emergence and top-down agenda reinforcement during the homecoming period.

By situating computational results within this theoretical framework, the analysis demonstrates how digital interactions contribute to the construction, circulation, and intensification of public concerns, offering insight into how toll road issues gain salience in the digital public sphere.

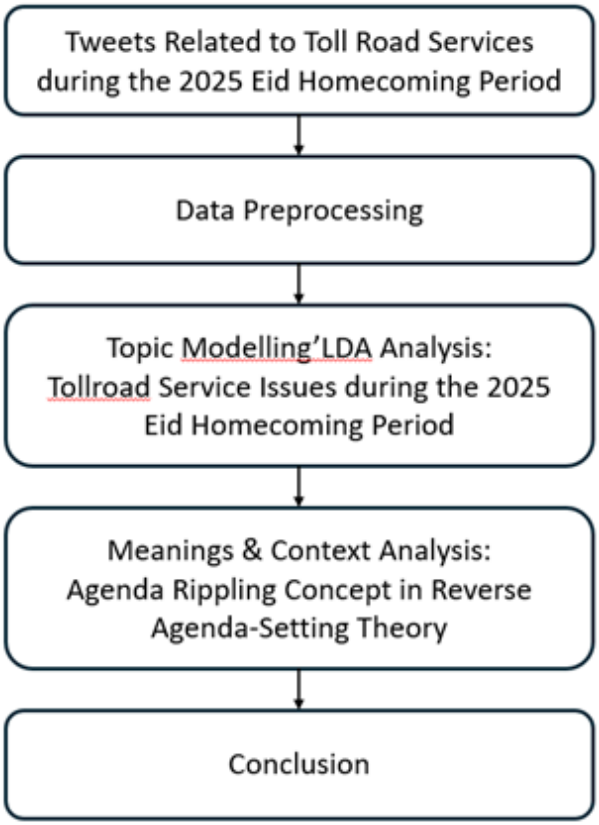

Figure 1. Research Design Diagram

3. Results and Discussion

3.1. Digital Data Visualization

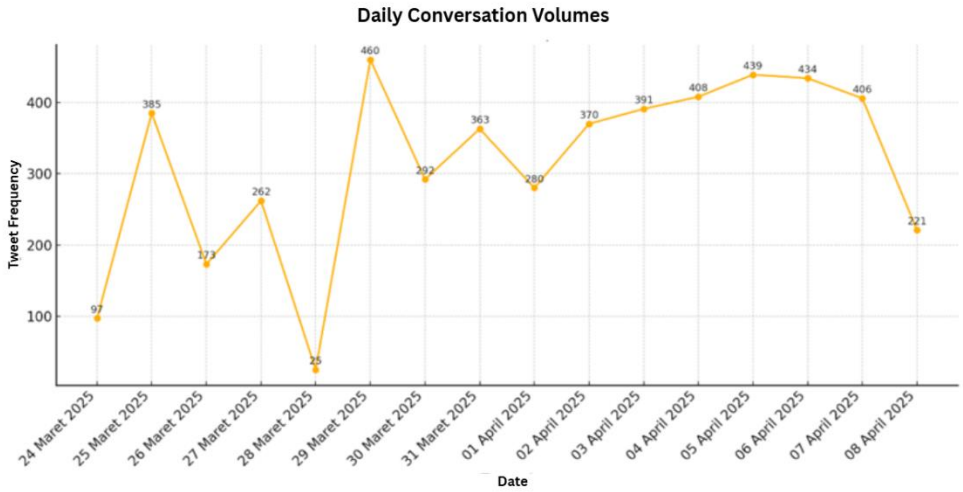

Figure 2. Trend Graph of the Number of Tweets

The temporal distribution of tweets during the Eid homecoming period shows clear fluctuations in public attention, with several pronounced peaks corresponding to traffic congestion, accident reports, and changes in traffic engineering policies. Instead of functioning merely as numerical indicators, the spikes in tweet volume reflect moments when citizens actively voiced concerns or sought clarification regarding toll road conditions. These fluctuations may be interpreted as early signals of issue salience, indicating when certain events or disruptions captured public attention and began circulating widely within digital networks. In the context of agenda rippling, these peaks illustrate how user-generated reports can trigger collective monitoring behaviours that precede institutional responses.

The word cloud generated from the corpus supports this pattern by highlighting frequently used terms such as *macet*, *jalan*, KM, rest area, and *info*. While these words reflect common themes associated with homecoming travel, their prominence also signifies how public conversations tend to gravitate toward immediate, situational concerns. The dominance of operational and location-specific terms suggests that Twitter functioned primarily as a real-time reporting space rather than a platform for abstract debates. This pattern aligns with early-stage bottom-up agenda rippling, where issue visibility is driven by practical, experience-based information sharing among users.

Figure 3. Word Cloud Related to Toll Roads during the 2025 Eid Homecoming Period (H-7 to H+7)

The word cloud generated from 5,006 Twitter (X) posts analysed using Orange Data Mining software revealed several dominant keywords frequently mentioned by users during the 2025 Eid homecoming period. The words "*jalan*" (road) and "*tol*" (toll) appeared most prominently, with 5,868 and 5,448 occurrences, respectively, indicating that public conversations heavily revolved around toll road accessibility and conditions. Other frequently used words, such as "*ruas*" (section), "*jalur*" (lane), and "*perjalanan*" (journey), emphasized the public's focus on technical details, routes, and traffic flow, including concerns about smoothness, congestion, and available alternative routes.

The term "*mudik*" (homecoming) ranked fourth in frequency (842 occurrences), reflecting the temporal alignment of discussions with the 2025 Eid holiday travel period. Meanwhile, the words "*marga*" and "*jasa*" referred to Jasa Marga, the state-owned toll road operator, frequently mentioned in discussions about policies, digital services, and public information. This is further supported by the emergence of words such as "*aplikasi*" (application), "*tautan*" (link), and "*infografis*" (infographic), suggesting that the public actively engaged with and responded to official and digital communication channels provided during the travel period.

Other notable topics pertained to toll road operational management, as seen in the appearance of words like "*non*", "*khusus*"

(special), and "*truk*" (truck), reflecting public attention toward traffic restrictions on certain vehicle types, functional routes, and traffic regulations implemented during the homecoming and return phases. These findings align with national traffic management policies such as one-way systems, contraflow, heavy vehicle restrictions, and non-toll diversions. The recurrence of terms like "*pengguna*" (user), "*saldo*" (balance), and "*uang*" (money) highlights practical aspects of traveller experiences, particularly regarding electronic toll payment readiness, which is also linked to words referencing e-toll balance checks and the use of the Travoy application.

Overall, the word cloud illustrates that public conversations during the 2025 Eid homecoming and return period were strongly influenced by road conditions, with dominant themes centered on congestion, traffic management, and safety. These finding underscores how social media functions as both an expressive and a real-time reporting platform for toll road users during Indonesia's largest annual travel season.

3.2. Topic Modelling LDA

To explore thematic patterns within the dataset, Latent Dirichlet Allocation (LDA) was applied to the pre-processed corpus. Several models with two to twenty topics were tested, and their performance was assessed using the c_v coherence metric. While coherence values varied across candidate models, the nine-topic configuration achieved the best balance between statistical coherence and interpretability. The number of topics allowed the model to capture the complexity of homecoming-related conversations without generating overly fragmented or redundant themes.

The nine topics identified through LDA reflect a diverse range of public concerns. Topic 6 contains firsthand accounts of congestion, accidents, and on-road experiences, illustrating the public's active role in documenting mobility challenges. Topic 8 consists largely of institutional updates, including announcements about contraflow, one-way schemes, and toll gate operations. Topic 3 captures dissatisfaction with service quality, highlighting the perceived mismatch between public expectations and actual toll road performance. Other topics include logistical questions, travel tips, emotional reactions to delays, concerns about traffic law enforcement, and commentary on rest area availability.

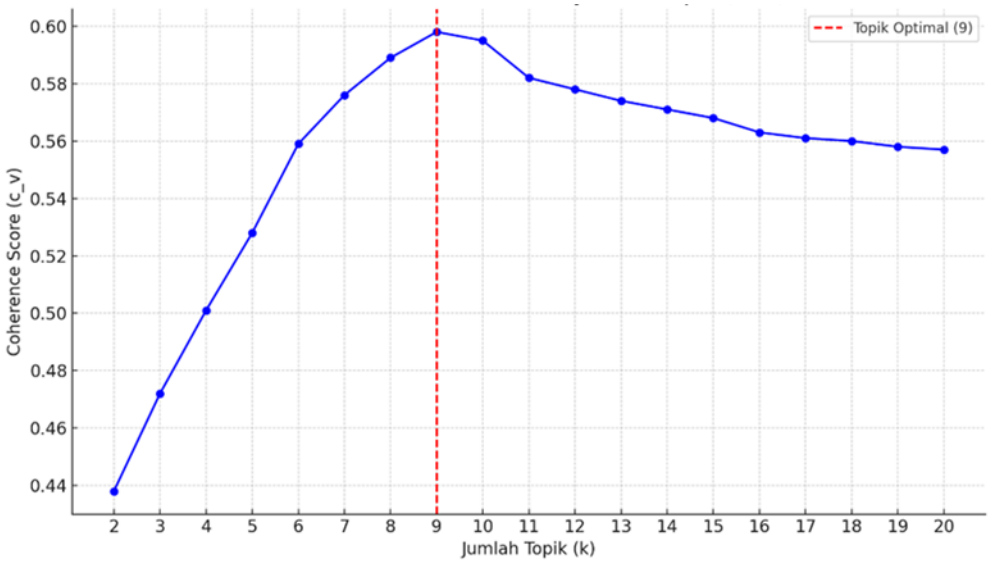

Figure 4. Coherence Score and Number of Topics in LDA Topic Modeling

The coherence score graph illustrates the performance of candidate LDA models with topic numbers ranging from 2 to 20. The *c_v coherence metric* was selected because it evaluates semantic similarity among the most frequent words within each topic, making it suitable for short, noisy social media texts. The coherence values rise steadily before reaching a peak at nine topics, after which the scores decline or remain flat. This pattern indicates that models with more than nine topics begin to fragment major themes into overly granular clusters, reducing semantic coherence and yielding topics that are less interpretable. The nine-topic configuration, therefore, represents the optimal balance between statistical performance and conceptual clarity.

Beyond statistical indicators, topic interpretability was also used as a criterion, following recommendations in recent computational communication studies. Models with fewer than nine topics merged distinct public concerns into broad, indistinct clusters, while models with more than nine topics generated redundant or trivial themes (e.g., clusters dominated by single slang terms). The selected model, in contrast, produced thematically stable and non-overlapping topics that aligned with the dynamics of public discourse during the homecoming period. This dual evaluation (coherence score and human interpretability) strengthens the validity of topic selection and addresses common criticisms regarding the arbitrary use of coherence metrics in LDA research.

Subsequently, to identify the nine topics and their corresponding keywords, further analysis was conducted using the Orange Data Mining application, following the workflow described below:

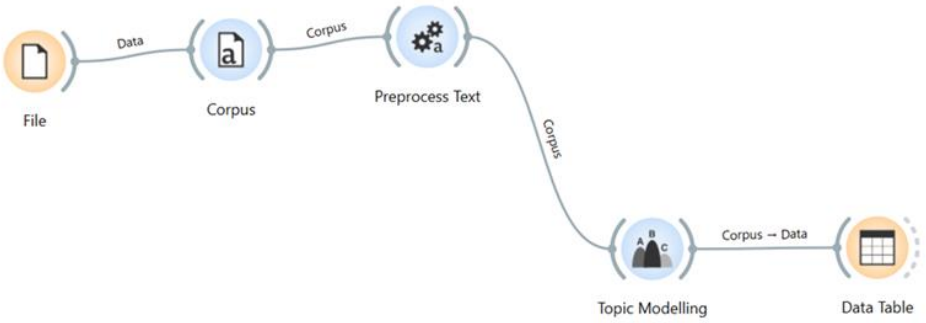

Figure 5. Workflow of LDA Topic Modeling in the Orange Data Mining

The LDA modelling workflow was implemented using Orange Data Mining and consisted of four major steps: (1) importing the pre-processed 5,006 tweets, (2) constructing the text corpus and applying cleaning operations (removal of mentions, punctuation, and stopwords), (3) fitting the LDA model to identify latent themes, and (4) converting the outputs into tabular format for further qualitative interpretation. Rather than focusing on software-specific procedures, the workflow reflects a standard, replicable pipeline commonly adopted in natural language processing research. This ensures transparency in analytical procedures without overemphasising tool-specific technicalities.

The nine extracted topics, each represented by dominant keywords and a probability distribution across documents, were subsequently subjected to qualitative interpretation to assign meaningful thematic labels. This interpretive validation addresses limitations of unsupervised models, which are prone to generating ambiguous or context-dependent topics, especially in short-text environments like Twitter. Through this combined computational–interpretive approach, the selected topics were confirmed to reflect coherent discursive clusters relevant to toll road services and the broader agenda rippling dynamics observed during the 2025 Eid homecoming period.

Table 1. Topics and Keywords of Conversations Related to Toll Roads during the 2025 Eid Homecoming Period

Topic	Topic Keywords
1	tol, pastikan, jalan, pengguna, saldo, perjalanan, ruas, jagorawi, mengalami, uang

2	jalan, tol, banyuwangi, orang, mulus, bikin, gue, tangerang, lo, banget
3	jalan, tol, lancar, mudik, padat, kepadatan, lajur, hati, arteri, lebaran
4	tol, jalan, kiri, pekerjaan, hati, perbaikan, arah, badan, kereta, kota
5	tol, jalan, marga, jasa, ruas, pengaturan, operasional, barang, angkutan, pembatasan
6	jalan, tol, bahu, arah, lancar, prambanan, lintas, terpantau, mobil, area
7	jalan, tol, mudik, aman, via, jasa, marga, buku, digital, saku
8	tol, jalan, mudik, arus, lebaran, lintas, maret, one, way, arah
9	non, tol, jalan, jalur, kendaraan, bus, ruas, truk, fungsional, kepolisian

The table consists of two main columns: (1) the topic number (1-9) and (2) the dominant keywords representing each topic. Each row presents one topic along with a list of ten words that carry the highest significance in shaping that particular topic. These words are automatically generated by the LDA algorithm based on their frequency of occurrence and semantic relationships within the document corpus.

The transition from keywords to topic labels was carried out inductively using a qualitative descriptive approach. Each topic was then assigned a name reflecting the focus of discussion and accompanied by a narrative explanation describing the issue addressed, the actors involved, or the experiences expressed by the public.

Table 2. Topics and Interpretations of Conversations on Toll Road Services during the 2025 Eid Homecoming Period

Topic	Dominant Keywords	Topic Interpretation
Topic 1	tol, pastikan, jalan, pengguna, saldo, perjalanan, ruas, jagorawi, mengalami, uang	Discussions focused on the **technical preparations for travelers**, particularly regarding the use of toll roads and e-toll balance readiness. The public tended to ensure sufficient balance and plan routes in advance, especially on major corridors such as the Jagorawi Toll Road.

Topic	Dominant Keywords	Topic Interpretation
Topic 2	jalan, tol, banyuwangi, orang, mulus, bikin, gue, tangerang, lo, banget	This topic represents **personal public comments and real-time observations** on toll road infrastructure conditions, expressed in an informal and subjective tone. It reflects users' perceptions and direct experiences while passing through specific areas such as Banyuwangi and Tangerang.
Topic 3	jalan, tol, lancar, mudik, padat, kepadatan, lajur, hati, arteri, lebaran	It highlights **traffic flow conditions**, especially the gap between public expectations of smooth travel and the actual congestion experienced on toll and non-toll roads during the homecoming period. Words such as *"arteri"* (arterial) and *"lebaran"* (Eid) indicate crucial temporal and spatial contexts.
Topic 4	tol, jalan, kiri, pekerjaan, hati, perbaikan, arah, badan, kereta, kota	This topic relates to **toll road infrastructure disruptions**, such as road maintenance, lane closures, or other construction activities affecting traffic flow. It also pertains to **travel routes and intermodal connectivity**.
Topic 5	tol, jalan, marga, jasa, ruas, pengaturan, operasional, barang, angkutan, pembatasan	It refers to **operational regulations and vehicle restrictions**, particularly traffic management measures implemented by authorities such as the **Police** and the **Ministry of Transportation**, as well as toll road operators like **Jasa Marga**. Words such as *"barang"* (goods) and *"angkutan"* (transport) indicate a focus on specific vehicle categories under restriction.
Topic 6	jalan, tol, bahu, arah, lancar, prambanan, lintas, terpantau, mobil, area	This topic involves **real-time traffic monitoring**, conducted by both the public and the media. Mentions of specific locations such as **Jagorawi** or **Prambanan** suggest that the content includes field condition reports.

Topic	Dominant Keywords	Topic Interpretation
Topic 7	jalan, tol, mudik, aman, via, jasa, marga, buku, digital, saku	It represents **digital information and travel guidance services**, such as digital handbooks, infographics, or features within official applications (e.g., those by Jasa Marga), emphasizing **safety and accessibility of information** for travelers.
Topic 8	tol, jalan, mudik, arus, lebaran, lintas, maret, one, way, arah	This topic is related to **traffic management during the homecoming and return periods**, including the implementation of **one-way systems**, **travel scheduling** (with March marking the start of homecoming traffic), and public perceptions of traffic surges leading up to Eid.
Topic 9	non, tol, jalan, jalur, kendaraan, bus, ruas, truk, fungsional, kepolisian	The topic focuses on **non-toll routes and heavy vehicles**, encompassing discussions about **traffic diversions, functional alternative routes**, and **law enforcement supervision** by the police throughout the homecoming traffic flow.

The nine topics generated by the LDA model illustrate a wide range of public issues, spanning from practical concerns such as e-toll balance and traffic congestion to more strategic aspects such as traffic engineering policies and vehicle monitoring systems. These findings demonstrate that public discourse surrounding toll road travel during the 2025 Eid homecoming and return periods was not merely reactive to individual experiences but also reflective of broader policy measures, including traffic management regulations and toll road infrastructure readiness.

However, the distribution of tweet volume across topics, visualized through the Orange Data Mining application, reveals that public attention was not evenly distributed among all topics. Therefore, as part of the subsequent analysis stage, the mapping of tweet frequency per topic was conducted to identify which topics generated the highest levels of public discussion. This step is essential to refine the analysis and focus on issues that most accurately represent the collective concerns and attention of the public during the 2025 Eid homecoming period.

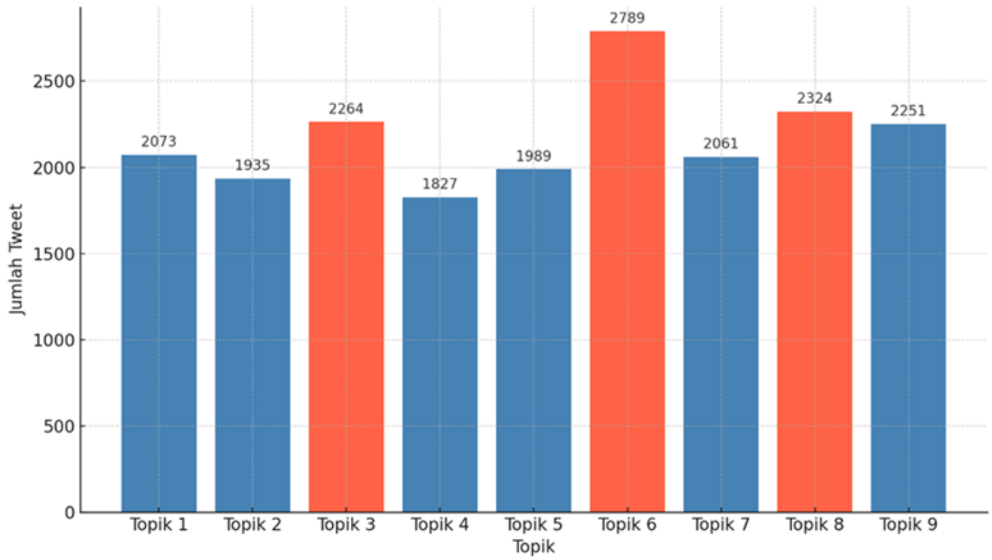

Figure 6. Distribution of the Number of Tweets across Topics

Based on the graph, variations can be observed in the intensity of public conversations among the nine topics identified by the LDA model. Among all analysed topics, the three with the highest number of tweets are Topic 6, Topic 8, and Topic 3, which are highlighted in orange on the graph to indicate their high levels of public engagement during the 2025 Eid homecoming and return periods.

Topic 6 is the most discussed, with a total of 2,789 tweets. This topic reflects the public's real-life experiences on the ground, particularly concerning traffic congestion during the homecoming and return periods, proper driving behaviour on toll roads, reports of traffic accidents, and reactions to other drivers' conduct. Conversations within this topic are largely narrative and descriptive in nature, illustrating how toll road users actively share real-time information about traffic conditions for the benefit of news outlets or fellow travellers. Meanwhile, Topic 8, which comprises 2,324 tweets, is dominated by official information from authorities such as the Police and toll road operators like Jasa Marga. The discussions include announcements about toll gate operations, return traffic management, and road section coordination. This indicates a strong public demand for credible and up-to-date information during critical travel periods. Topic 3, ranked third with 2,264 tweets, represents public discussions highlighting the gap between expectations and the actual experiences of toll road users. Conversations under this topic often express complaints, personal

opinions, and comparisons with other modes of transportation, particularly regarding efficiency and comfort.

The key distinction between Topic 6 and Topic 3, both of which directly involve road users, lies in their tone and communicative intent. Topic 6 is more informative and narrative, where users share updates on traffic congestion, accidents, and driving etiquette, thereby serving as a real-time information source for other travellers. In contrast, Topic 3 primarily consists of expressions of dissatisfaction and personal critique, reflecting the dissonance between public expectations and the actual conditions encountered on toll roads, focusing on complaints, criticism, and comparative evaluations.

Overall, this graph reinforces that public attention during the 2025 Eid homecoming period was predominantly centred on practical and operational aspects that directly affected travel comfort and efficiency. The three most-discussed topics reveal a strong interconnection between personal experiences, the need for technical information, and on-ground challenges, forming a clear pattern of public communication within the broader context of national infrastructure and mobility. Focusing on these three key topics is essential, as they collectively represent the core issues and public concerns during the 2025 Eid travel period and highlight the intersection between technical factors, transportation policy, and personal experience that shape digital public discourse.

3.3. Agenda Rippling Concepts in Public Discourse

Agenda rippling refers to the dissemination of concerns initiated by individuals or magnified by institutions through internet interactions. This dataset demonstrates the reciprocal relationship between public experiences and institutional messages: citizens frequently initiated the visibility of issues, while institutional actors elucidated, rectified, or enhanced these narratives. This dynamic illustrates the mixed character of digital agenda dynamics, when neither the public nor institutions serves as an exclusive agenda driver.

3.3.1 Bottom-Up Rippling: Public Monitoring and Experience Sharing

3.3.1.1 Public Monitoring and Reporting of Traffic Flow (Topic 6)

Topic 6, which includes keywords such as "jalan, tol, bahu, arah, lancar, prambanan, lintas, terpantau, mobil, area," reflects a public discourse shaped by citizens' real-life experiences while traveling on toll roads. The narratives categorized under this topic largely originate from direct field observations, often shared through photos, videos, or firsthand reports on social media. Users documented traffic congestion, vehicles driving on the road shoulder, and specific toll road segments. Such as those near Prambanan, related to the temporary opening of the Jogja-Solo Toll

Road, or along the Jagorawi Toll Road. This issue illustrates the active role of citizens in shaping public agendas that emerge from the social realities they personally experience. When posts concerning traffic density and violations on toll roads spread widely, the discourse evolves into a form of collective pressure, drawing broader public and media attention.

This agenda develops organically, not solely dependent on media or authority framing. In fact, mainstream media outlets often cite social media users' reports as credible field information. As noted in previous research, the agenda rippling process in reverse agenda setting often begins when citizens' opinions circulate rapidly through online channels and exert significant influence on internet discussions, even becoming dominant topics in the online blogosphere (Wibowo & Karlinah, 2018). Agenda rippling, as the initial stage of the reverse agenda-setting process, has thus proven to play a crucial role in shaping various types of public issues across contexts.

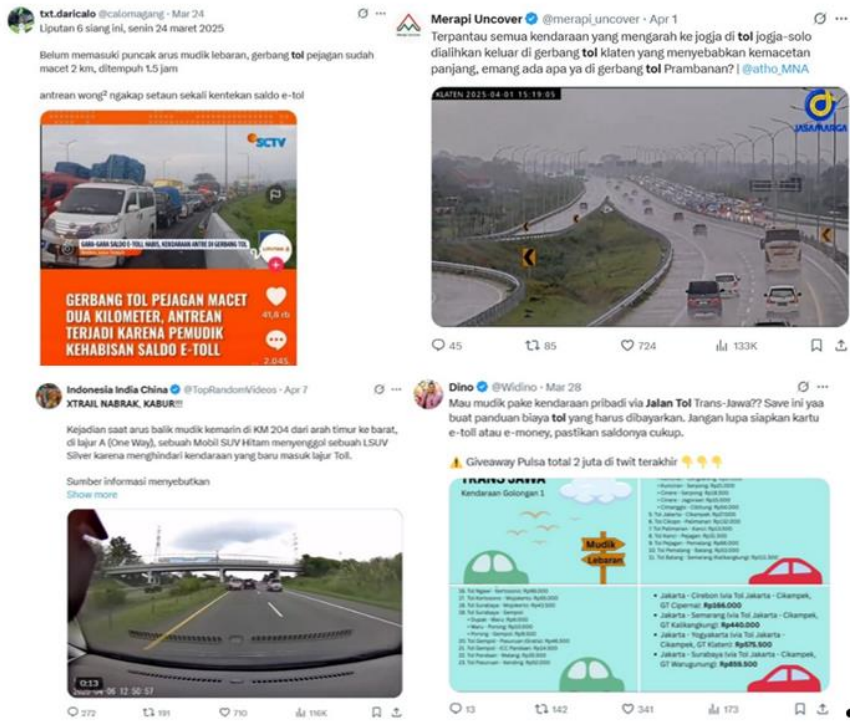

Figure 7. Tweets on Public Monitoring and Reporting of Traffic Flow

3.3.1.2 Traffic Management for Eid Homecoming and Return Flows by Institutions (Topic 8)

Topic 8, characterized by keywords such as *"*tol, jalan, mudik, arus, lebaran, lintas, maret, one, way, arah*,"* represents public narratives closely

related to traffic management policies, particularly the implementation of the one-way traffic system during the Eid homecoming period. Public complaints about inadequate on-site information or unprepared facilities were voiced across various digital channels. This topic illustrates that the public not only shares their personal experiences but also brings forward policy-related issues that require clarity and effective dissemination.

Unlike Topic 6, this theme highlights how institutions such as the Police and Jasa Marga actively responded to the public agenda by communicating traffic management measures for both homecoming and return flows through their official social media channels. These institutional responses were subsequently amplified by mainstream media, which reported on the public's concerns alongside official explanations from relevant authorities. When mainstream media elevate citizens' complaints into major news stories and include institutional responses from bodies like the Police or Jasa Marga, the public agenda evolves into an institutional agenda.

This demonstrates a key distinction between Topic 8 and Topics 6 and 3, showing how the agenda rippling process can function within the context of institutional agenda formation, where issues originating from public discourse gradually influence and are absorbed into organizational or policy-level communication dynamics.

Figure 8. Tweets on Traffic Management by Institutions

Although not a national-scale phenomenon, the study by Jiang & Fu (2018) Illustrates a similar pattern, showing how the #MeToo movement in China experienced agenda rippling through the social media platform Weibo, where users adopted the coded term *"rice bunny" (mi tu)* to circumvent censorship. Their study revealed that public opinion initially emerged from the individual experiences of sexual harassment victims shared on social media, which then spread virally and generated a wave of public awareness. This growing momentum ultimately compelled traditional media to cover the issue despite strict censorship constraints. The phenomenon demonstrates the power of agenda rippling in transforming issues that were once hidden into matters of national public concern, even within tightly controlled media environments.

3.3.1.3 The Gap Between Public Expectations and Travel Experiences (Topic 3)

Topic 3, which contains keywords such as "jalan, tol, lancar, mudik, padat, kepadatan, lajur, hati, arteri, lebaran", illustrates a public narrative highlighting the persistent gap between public expectations for smooth traffic during the Eid homecoming and the actual reality of congestion experienced on the road, including on non-toll (arterial) routes. Social media users expressed disappointment over long travel times, heavy traffic conditions, insufficient management of high vehicle volumes, and the lack of adequate supporting facilities such as rest areas. In other words, discourses in the form of public information and complaints were subsequently amplified by media coverage, becoming part of periodic and strategic reporting agendas.

The rippling effect is clearly visible when online news outlets pick up and report these public discussions, thereby extending the agenda's diffusion from social media to mainstream media. This finding aligns with the study by Humeira & Ramadhan (2022), which explains that the concept of the Reverse Agenda-Setting Theory demonstrates how the public no longer relies on the media to shape their agenda; rather, the media now follows and elevates issues that have already emerged among the public spheres.

Figure 8. ***Tweets on the Gap Between Public Expectations and Travel Experiences***

3.3.2 Interpretive Rippling: Expectations and Frustrations

The examination of the three prevailing subjects uncovers two unique yet interrelated agenda-setting processes that shape the public debate around toll road services during the 2025 Eid homecoming period. These patterns illustrate the emergence, dissemination, and prominence of issues within the digital public sphere through reciprocal interactions among regular users, institutional players, and mainstream media. The recognition of these patterns aligns with Kim & Lee, 2006 Concept of agenda rippling, which highlights the complex nature of issue dissemination in digital communication contexts.

Table 3. Agenda *Rippling Patterns in Toll Road Service Issues During the 2025 Eid Homecoming Period*

Agenda Rippling Pattern	Type of Topic	Dissemination Mechanism	Example Tweet
Bottom-up (User Generated Issue)	• Public Monitoring and Reporting of Traffic Flow • Gap Between Public Expectations and Travel Experiences	Personal experiences → Viral on social media → Quoted by mainstream media	"Severe congestion at KM 130 Cipali due to a single-vehicle accident."
Top-down Amplified	Traffic Management for Eid Homecoming and Return Flows on Toll Roads	Official information from institutions → Distributed through official accounts → Diversified and commented on by the public	"Use the Travoy app to check toll road routes and top up your e-toll balance."

3.3.2.1 Bottom-Up Rippling: Public Oversight and Experience-Driven Narratives

The bottom-up pattern illustrates the progression of unique user experiences into broadly recognized societal concerns. Subjects like real-time traffic monitoring (Topic 6) and grievances regarding service inconsistency (Topic 3) stem from unsolicited personal narratives shared by travelers. These posts often contain geographical indicators, time information, or eyewitness accounts, which enhance their legitimacy and expedite their dissemination. As these accounts disseminate via retweets, replies, and quote tweets, they acquire exposure and communal endorsement. In numerous cases, these user-generated reports were later reiterated by news outlets, demonstrating how public conversation may influence the informational agenda of institutional and media entities. This approach illustrates early-stage agenda rippling, wherein issue salience emerges from personal experiences rather than institutional signals.

3.3.2.2 Top-Down Amplified Rippling: Institutional Communications Reinforced by Public Engagement

In contrast, the top-down amplified pattern illustrates the dissemination of government information, specifically regarding contraflow, engineering measures, or toll gate operations (Topic 8) through public redistribution. The impact of institutional communications is significantly contingent upon user engagement and dissemination. Public commentary frequently encompasses assessments, skepticism, or reinterpretations of institutional announcements, so it converts official updates into socially mediated narratives. This dynamic suggests that institutional authority alone does not dictate message prominence; instead, salience arises when the public actively engages with and amplifies these messages. The amplification process integrates institutional information into the broader digital discourse, allowing it to influence agenda setting.

4. Conclusion

The analysis of toll road–related conversations during the 2025 Eid homecoming period reveals how public discourse on X (Twitter) reflects dynamic interactions between everyday user experiences and institutional communication. This study illustrates that public discourse regarding toll road services during Indonesia's 2025 Eid homecoming period was influenced by a dynamic interaction between grassroots reporting and institutional communication, highlighting a bidirectional agenda-setting process based on Reverse Agenda-Setting theory. Through LDA topic modelling, three themes emerged as the most prominent: (1) real-time, experiential reports on traffic conditions, accidents, and driving behavior (Topic 6); (2) official communications from authorities, including the Police and Jasa Marga, concerning traffic management strategies such as one-way systems and contraflow (Topic 8); and (3) public expressions of discontent arising from the disparity between anticipated smooth travel and the actual experience of congestion and infrastructural deficiencies (Topic 3). These themes illustrate that public discussion during the homecoming period is shaped by a combination of spontaneous reporting, critical reflection, and the circulation of official updates.

This study provides an empirical contribution by showing how computational topic modelling, when combined with theory-guided interpretation, can help identify early indicators of public concern in large-scale digital conversations. The digital public sphere operated as both a real-time surveillance mechanism and a participatory platform for influencing transportation policy dialogue during a pivotal national mobility event.

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