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Policy network fragmentation and the conflict paradox in metropolitan traffic governance: Evidence from greater Bandung, Indonesia

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Abstract

Background: Traffic congestion in the Greater Bandung Metropolitan Area (KMBR) has evolved into a complex governance challenge characterized by a "conflict paradox," in which localized traffic interventions unintentionally generate congestion spillovers across administrative boundaries. Despite regular intergovernmental coordination, congestion remains persistent across the metropolitan region.

Aims: This study examines how policy network fragmentation contributes to the conflict paradox and assesses the effectiveness of collaborative governance in metropolitan traffic management.

Method: A descriptive-explorative qualitative approach was employed. Data were collected through in-depth interviews with transportation officials from five jurisdictions within the KMBR and complemented by regulatory document analysis, including West Java Provincial Regulation No. 12 of 2014. The analysis was guided by Van Waarden's policy network framework and Ansell and Gash's collaborative governance model.

Results: The findings reveal that metropolitan traffic governance is constrained by fragmented institutional structures, asymmetric power relations, and predominantly non-binding coordination mechanisms. Although coordination forums occur regularly, collaboration remains procedural rather than strategic. The prevalence of parochial ego-sectoralism encourages jurisdictions to prioritize local political and budgetary interests, causing traffic interventions to shift congestion problems across boundaries and reinforce the conflict paradox.

Conclusion: Traffic congestion in the KMBR is fundamentally a governance issue rooted in policy network fragmentation and collaborative failure. Strengthening metropolitan governance through legally enforceable and integrated coordination mechanisms is essential for achieving sustainable regional mobility.

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INTRODUCTION

Urban traffic congestion has increasingly become one of the most challenging issues faced by metropolitan regions throughout the world. Rapid growth in urban populations, economic activities, and private vehicle ownership has placed unprecedented pressure on transportation systems (Faiyetole & Adewumi, 2024; Filippi, 2022; Gao & Zhu, 2022; Mavlutova et al., 2023). As metropolitan areas expand beyond administrative boundaries, transportation networks become more interconnected and dependent on coordinated governance arrangements. Conventional congestion management strategies have largely focused on technical solutions such as road widening, signal optimization, and traffic engineering interventions (Karimi et al., 2022; Mystakidis et al., 2025; Yue et al., 2021). Although these approaches may provide temporary relief, they often fail to address the structural and institutional factors that contribute to recurring congestion problems. In many metropolitan regions, transportation challenges are shaped not only by infrastructure limitations but

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also by fragmented governance systems and competing policy priorities (Kitchin & Moore-Cherry, 2021; Oden & Sciara, 2020; Skuzinski et al., 2024; Yang et al., 2025). The increasing complexity of urban mobility has transformed congestion into a multidimensional governance problem involving multiple actors and jurisdictions. This situation is particularly evident in decentralized governance systems where local governments possess substantial autonomy over transportation planning and management. As a result, achieving integrated transportation governance requires effective coordination among institutions operating across administrative boundaries. Understanding the governance dimensions of metropolitan congestion is therefore essential for developing sustainable and long-term transportation solutions.

The Greater Bandung Metropolitan Area represents one of Indonesia's most important urban regions and serves as a major center of economic, educational, and social activities. The metropolitan area consists of five interconnected jurisdictions that share extensive commuter movements and transportation networks. Rapid urban expansion has significantly increased travel demand, resulting in growing pressure on road infrastructure and public transportation services (Ceder, 2021; Faiyetole & Adewumi, 2024; Gao & Zhu, 2022; Zhou & Gao, 2020). Daily mobility patterns demonstrate a high level of interdependence among jurisdictions, with substantial numbers of residents crossing administrative boundaries for work, education, and commercial activities (Chekero, 2023; Choudhury, 2022). Consequently, transportation conditions in one jurisdiction frequently influence traffic performance in neighboring areas. Despite the existence of various coordination forums and intergovernmental interactions, congestion continues to affect numerous strategic corridors throughout the metropolitan region. The persistence of congestion indicates that existing governance mechanisms have not been fully effective in achieving regional transportation integration. Many traffic management initiatives remain localized and are designed primarily to address problems within individual jurisdictions. Such interventions often overlook the broader metropolitan context in which transportation systems operate as interconnected networks. This condition highlights the need to examine how governance arrangements influence the effectiveness of metropolitan traffic management.

The governance challenges associated with metropolitan transportation are closely related to the structure and quality of interactions among public institutions. Transportation agencies operating within different jurisdictions frequently pursue distinct policy objectives, budgetary priorities, and political agendas (Ferry, 2021; Sciara et al., 2024). Although coordination activities occur regularly, collaboration often remains procedural rather than strategic in nature. Local governments tend to prioritize visible short-term outcomes that can be directly attributed to their administrative performance. Consequently, transportation interventions designed to reduce congestion in one area may unintentionally transfer traffic burdens to neighboring jurisdictions. This phenomenon creates a governance dilemma in which localized solutions generate new regional transportation problems. The resulting condition reflects the existence of fragmented policy networks that are unable to effectively synchronize transportation policies across administrative boundaries. In addition, differences in institutional capacity and political influence may create imbalances in decision-making processes among participating jurisdictions (Eilstrup-Sangiovanni & Westerwinter, 2022; Krishnan, 2023; Webler & Tuler, 2021). These asymmetries can undermine trust, weaken collective commitment, and discourage meaningful collaboration. Therefore, understanding the relationship between policy network fragmentation and metropolitan traffic governance is essential for explaining the persistence of congestion in complex urban regions.

Although previous studies have extensively examined policy fragmentation, collaborative governance, cross-boundary governance, and metropolitan governance across various policy domains, important gaps remain in understanding their interconnected role within metropolitan traffic governance systems. Existing research on policy fragmentation primarily focuses on global

governance, environmental management, and public policy networks, emphasizing institutional complexity and coordination challenges (Frohlich et al., 2023; R. E. Kim, 2020; Perez et al., 2022), while studies on collaborative governance predominantly explore collaborative processes, stakeholder inclusion, governance evolution, and implementation challenges in environmental, health, and public administration contexts (Bianchi et al., 2021; McNaught, 2024; Ulibarri et al., 2020; Wang et al., 2023). Similarly, the literature on cross-boundary governance highlights the importance of inter-jurisdictional collaboration in addressing regional environmental, land-use, and sustainability issues (Alem, 2021; Suo et al., 2023; Ye et al., 2023), whereas metropolitan governance studies largely focus on institutional arrangements, regional cooperation, and public transport systems (Moore-Cherry et al., 2022; Osei Kwadwo & Skripka, 2022; Sørensen et al., 2023). However, limited research has investigated how policy network fragmentation contributes to collaborative governance failure in metropolitan traffic management, particularly in explaining why frequent intergovernmental coordination often fails to produce integrated congestion solutions. Moreover, previous studies rarely examine how localized traffic interventions implemented by individual jurisdictions may generate unintended congestion spillovers across administrative boundaries, creating new governance challenges for neighboring jurisdictions. Consequently, the governance mechanisms linking policy network fragmentation, collaborative failure, and cross-boundary congestion dynamics remain insufficiently understood. To address this gap, the present study introduces the concept of the conflict paradox as a governance-based explanation for how fragmented policy networks and ineffective collaboration can unintentionally transform localized traffic solutions into metropolitan-scale congestion problems.

This study aims to investigate the role of policy network fragmentation in shaping metropolitan traffic governance within the Greater Bandung Metropolitan Area. The research seeks to examine how governance structures influence the effectiveness of inter-jurisdictional collaboration in managing transportation challenges. Particular attention is given to understanding the interactions among governmental actors responsible for transportation planning and implementation. The study also explores the institutional conditions that facilitate or constrain collaborative governance processes. In addition, it analyzes the distribution of authority, resources, and decision-making power among participating jurisdictions. The research employs a policy network perspective to assess actor relationships, governance structures, and patterns of institutional interaction. Collaborative governance is further examined to evaluate the extent to which trust, commitment, and shared understanding contribute to regional transportation management. Through this analytical approach, the study seeks to identify the mechanisms through which governance fragmentation influences congestion outcomes. The research also develops the concept of the conflict paradox to explain how localized traffic interventions may unintentionally create new transportation burdens in neighboring jurisdictions. Ultimately, the study contributes to the advancement of metropolitan governance literature by providing empirical evidence on the relationship between policy network fragmentation, collaborative failure, and traffic congestion management in a decentralized urban governance setting.

LITERATURE REVIEW

Metropolitan traffic governance refers to the processes, institutions, and policy arrangements through which transportation systems are planned, coordinated, and managed across interconnected urban regions. Unlike conventional transportation management that focuses primarily on infrastructure provision and operational efficiency, metropolitan traffic governance emphasizes the integration of policies, actors, and decision-making processes operating across multiple administrative jurisdictions (Hossain et al., 2026; Skuzinski et al., 2024). The increasing

complexity of urban mobility has intensified the need for governance mechanisms capable of coordinating transportation policies beyond local administrative boundaries. Metropolitan regions often function as integrated socio-economic systems where daily mobility patterns transcend political and institutional divisions. Consequently, transportation challenges emerging in one jurisdiction frequently produce impacts that extend to neighboring areas. Effective metropolitan traffic governance therefore requires collaboration among multiple governmental actors, agencies, and stakeholders with differing interests and responsibilities (Damurski & Andersen, 2022; Hu et al., 2024). The quality of governance arrangements significantly influences the ability of metropolitan regions to address congestion, improve accessibility, and achieve sustainable mobility outcomes (Alamoudi et al., 2024; Anthony Jnr, 2023; Bokolo, 2025; Osei Kwadwo & Skripka, 2022). In fragmented institutional environments, however, transportation policies often become disconnected and difficult to coordinate. Such fragmentation can reduce policy effectiveness and hinder the implementation of integrated transportation strategies. Therefore, metropolitan traffic governance has become an increasingly important field of inquiry within contemporary urban and regional studies.

Policy network theory provides an analytical framework for understanding the interactions among actors involved in public policy processes. The theory assumes that policy outcomes are shaped not only by formal governmental structures but also by patterns of relationships among organizations, institutions, and stakeholders (Olivier & Schlager, 2022; Reinsberg & Westerwinter, 2021). Policy networks consist of interconnected actors who exchange information, resources, authority, and influence in pursuit of policy objectives (Locatelli et al., 2020; Schuster et al., 2021). These networks may vary in terms of their composition, institutionalization, power distribution, and rules of interaction. The effectiveness of policy implementation often depends on the quality of coordination and communication among network participants. Strong policy networks are generally characterized by trust, reciprocity, shared objectives, and clearly defined governance arrangements (Metz & Brandenberger, 2023; Sundram, 2025; Wegner & Verschoore, 2022). Conversely, weak policy networks may exhibit limited coordination, conflicting priorities, and ineffective decision-making processes. In metropolitan transportation systems, policy networks play a critical role because transportation policies frequently involve multiple jurisdictions and administrative levels. The complexity of transportation governance increases as the number of actors and institutions expands across metropolitan regions. Consequently, policy network theory offers a valuable perspective for examining governance challenges associated with metropolitan traffic management.

Policy network fragmentation occurs when relationships among actors become disconnected, poorly coordinated, or institutionally divided. Fragmentation may emerge as a consequence of overlapping authorities, conflicting policy objectives, unequal resource distribution, or weak institutional integration (de Wee & Jakoet-Salie, 2025; Faude & Fuss, 2020; Kreuder-Sonnen & Zürn, 2020). In fragmented networks, actors often prioritize organizational interests over collective goals, reducing the effectiveness of collaborative decision-making (Brattström & Faems, 2020; Sattler & Schröter, 2022). Such conditions frequently generate duplication of efforts, inconsistent policy implementation, and limited information sharing among participating institutions. Fragmentation can be particularly problematic in metropolitan regions where transportation systems require coordinated actions across administrative boundaries. The existence of multiple autonomous jurisdictions often creates challenges in aligning transportation policies, infrastructure investments, and traffic management strategies. As fragmentation increases, the capacity of governance systems to respond effectively to regional transportation problems tends to decline. Differences in political priorities and institutional capacities may further intensify governance fragmentation. Consequently, transportation interventions implemented by individual jurisdictions may fail to produce desired outcomes at the metropolitan scale. Understanding the

causes and consequences of policy network fragmentation is therefore essential for improving metropolitan transportation governance.

Collaborative governance has emerged as a prominent approach for addressing complex public policy problems that cannot be resolved by individual organizations acting independently. The concept emphasizes collective decision-making processes involving governmental actors, private organizations, civil society groups, and other relevant stakeholders (Hui & Smith, 2022; Nabiafjadi et al., 2021; Roman et al., 2020; Sadabadi et al., 2024). Collaborative governance seeks to create shared understanding, mutual trust, and joint commitment among participants in order to achieve common objectives. Effective collaboration is generally supported by inclusive participation, transparent communication, institutional legitimacy, and clearly defined procedural arrangements (Costumato, 2021; Stephenson, 2023). In metropolitan transportation contexts, collaborative governance is frequently viewed as a mechanism for overcoming jurisdictional fragmentation and promoting policy integration. Through collaboration, actors are expected to coordinate resources, share information, and develop collective solutions to regional transportation challenges. However, collaborative governance does not always guarantee successful outcomes. Differences in power, resources, political interests, and institutional capacities may constrain collaborative processes and undermine collective action. In some cases, collaboration becomes symbolic rather than substantive, resulting in limited policy integration despite frequent interactions among stakeholders. Therefore, evaluating the effectiveness of collaborative governance is critical for understanding governance performance in metropolitan transportation systems.

The concept of the conflict paradox provides a useful lens for explaining unintended consequences arising from fragmented metropolitan governance arrangements. A conflict paradox occurs when interventions designed to solve localized problems inadvertently create new problems elsewhere within an interconnected system. In metropolitan transportation governance, localized traffic management measures may improve conditions within one jurisdiction while simultaneously increasing congestion in neighboring jurisdictions (Karimi et al., 2022; Oden & Sciara, 2025; Skuzinski et al., 2024). This phenomenon reflects the interdependent nature of metropolitan transportation systems, where policy actions in one location generate spillover effects across administrative boundaries. The conflict paradox is particularly likely to emerge in governance environments characterized by fragmented policy networks and ineffective collaboration. Under such conditions, decision-makers often focus on local performance indicators without adequately considering broader regional implications. Consequently, transportation policies may shift congestion rather than reduce it at the metropolitan level. The persistence of this paradox highlights the limitations of isolated and jurisdiction-centered approaches to transportation governance. It also underscores the importance of integrated governance arrangements capable of aligning local interventions with regional mobility objectives. Therefore, the conflict paradox serves as a valuable theoretical framework for understanding how policy network fragmentation contributes to collaborative failure and persistent congestion in metropolitan regions.

METHOD

Research Design

This study employed a descriptive-explorative qualitative design to investigate metropolitan traffic congestion as a governance phenomenon within the Greater Bandung Metropolitan Area (KMBR). A qualitative approach was selected because the study sought to understand the institutional dynamics, actor interactions, and collaborative processes that shape metropolitan traffic governance. Unlike quantitative approaches that primarily focus on measurable traffic indicators, this design enabled a deeper examination of governance structures and policy network

relationships underlying congestion management. The study was grounded in an interpretive perspective that views congestion as a product of both technical and institutional factors. Particular attention was given to understanding how fragmented governance arrangements influence policy coordination across administrative boundaries. The research focused on identifying the mechanisms through which policy network fragmentation contributes to ineffective metropolitan traffic management. A case study strategy was adopted because the KMBR represents a complex metropolitan region characterized by multiple autonomous jurisdictions operating within a shared transportation system. The research examined governance interactions among transportation authorities responsible for addressing congestion across the region. Furthermore, the study explored the emergence of the conflict paradox, a condition in which localized traffic interventions unintentionally generate new transportation problems in neighboring jurisdictions. Through this qualitative design, the research sought to provide a comprehensive understanding of governance challenges affecting metropolitan traffic management.

Participants

Participants were selected using purposive sampling to ensure that only individuals with direct involvement in transportation governance and policy implementation were included in the study. The participant group consisted of key informants from transportation agencies operating across the five jurisdictions of the Greater Bandung Metropolitan Area, namely Bandung City, Cimahi City, Bandung Regency, West Bandung Regency, and Sumedang Regency. Informants included both policy-makers and technical personnel responsible for transportation planning, traffic management, infrastructure coordination, and regional mobility programs. These individuals possessed extensive knowledge regarding inter-jurisdictional coordination processes and metropolitan transportation challenges. The selection process prioritized participants who had experience in regional transportation forums, policy formulation, and cross-boundary traffic management initiatives. In total, thirty-four key informants participated in the study. Their professional backgrounds provided diverse perspectives on governance structures, institutional relationships, and collaborative practices. The inclusion of participants from multiple jurisdictions allowed the study to capture variations in governance experiences and policy priorities. This diversity also facilitated the identification of similarities and differences in transportation management approaches across jurisdictions. Consequently, the participant composition supported a comprehensive assessment of metropolitan traffic governance within the KMBR.

Instruments

Data collection employed a triangulation strategy integrating three complementary sources of evidence to enhance the credibility and trustworthiness of the findings. The first instrument consisted of a legal and regulatory analysis focusing on West Java Provincial Regulation No. 12 of 2014 concerning metropolitan development management. This analysis was conducted to identify formal mandates, institutional arrangements, governance structures, and legally prescribed coordination mechanisms governing metropolitan transportation management. The second instrument involved in-depth semi-structured interviews with key informants from transportation authorities across the five jurisdictions. Interview guidelines were developed based on the dimensions of policy network theory and collaborative governance to explore institutional interactions, coordination mechanisms, power relations, and governance challenges. Interviews provided detailed insights into both formal and informal governance practices influencing metropolitan traffic management. The third instrument consisted of field observations conducted at congestion hotspots and strategic transportation corridors throughout the KMBR. Observations focused on documenting traffic conditions, congestion patterns, and the implementation of local traffic management strategies. Particular attention was given to 168 identified congestion hotspots

and 149 primary causes of congestion distributed across the metropolitan area. The integration of documentary evidence, interviews, and observations enabled the study to compare institutional intentions with actual governance practices and transportation outcomes.

Data Analysis

Data analysis was conducted using thematic analysis guided by Van Waarden's policy network framework and supported by principles of collaborative governance. The analytical framework employed Van Waarden's seven dimensions of policy networks, namely actors, functions, structure, institutionalization, rules of conduct, power relations, and actor strategies. Interview transcripts, field notes, and regulatory documents were systematically reviewed and coded according to these dimensions. The analysis followed an interactive process consisting of data reduction, data display, and conclusion drawing. During the data reduction stage, relevant information was identified, categorized, and organized into meaningful themes associated with governance fragmentation and collaborative processes. In the data display stage, comparative matrices were developed to examine discrepancies between formal regulatory expectations and actual governance practices observed in the field. These matrices facilitated comparisons between institutional mandates and inter-jurisdictional interaction patterns. The analysis also examined the degree of formal versus informal coordination among participating jurisdictions and assessed the effectiveness of collaborative governance mechanisms. Particular attention was given to identifying institutional conditions that contributed to the emergence of parochial ego-sectoralism and the conflict paradox. Finally, conclusions were drawn by interpreting relationships among policy network fragmentation, collaborative failure, and metropolitan traffic governance outcomes.

Procedure

The research was conducted through a series of systematic stages designed to ensure methodological rigor and analytical consistency. The first stage involved identifying the research problem and conducting a comprehensive review of literature related to metropolitan governance, policy networks, collaborative governance, and transportation management. The second stage focused on developing research instruments and selecting participants based on predetermined inclusion criteria. During the third stage, documentary evidence was collected through the review of relevant regulations, planning documents, policy reports, and institutional records. The fourth stage involved conducting semi-structured interviews with key informants from transportation agencies across the five jurisdictions. Simultaneously, field observations were carried out to document congestion conditions and traffic management practices at strategic locations throughout the metropolitan region. The fifth stage consisted of data transcription, organization, coding, and thematic categorization based on the analytical framework. Subsequently, data triangulation was performed by comparing findings from interviews, observations, and documentary sources. The seventh stage involved constructing analytical matrices to evaluate the consistency between governance mandates and actual implementation practices. Finally, the findings were interpreted to explain the influence of policy network fragmentation on collaborative governance effectiveness and the emergence of the conflict paradox in metropolitan traffic management. The overall procedure enabled the study to systematically investigate governance dynamics shaping transportation outcomes within the Greater Bandung Metropolitan Area.

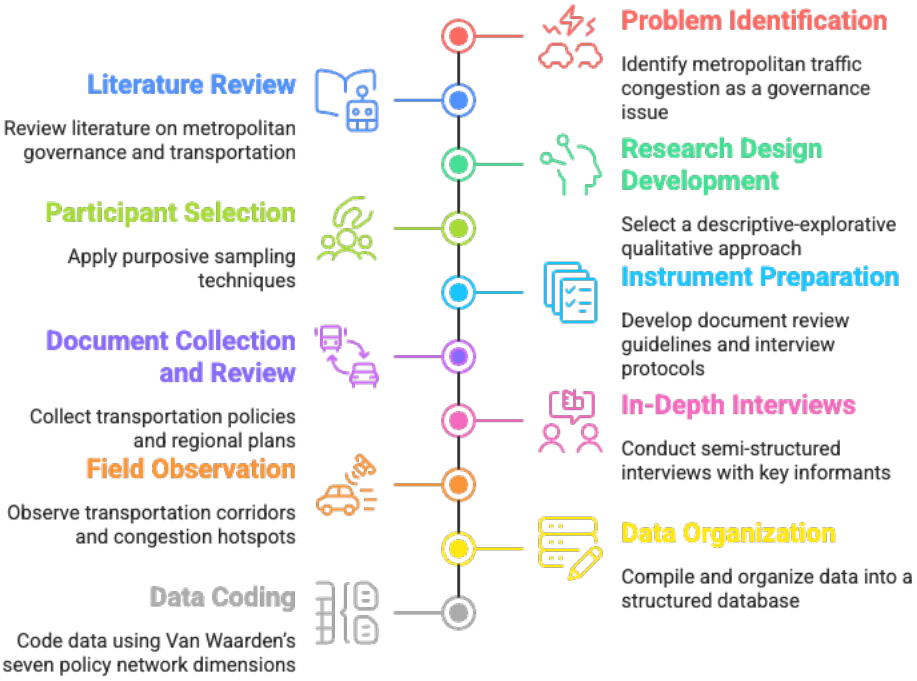

Figure 1. Research Method Flow

RESULTS AND DISCUSSION

Results

Spatial Distribution of Traffic Congestion in the Greater Bandung Metropolitan Area

Field observations identified 168 major congestion hotspots distributed across the Greater Bandung Metropolitan Area (KMBR), indicating that congestion is not concentrated solely within the urban core but has expanded throughout the metropolitan transportation network. The identified hotspots were found in Bandung City, Cimahi City, Bandung Regency, West Bandung Regency, and Sumedang Regency. The spatial distribution of congestion demonstrates that transportation challenges in the KMBR have evolved beyond localized traffic bottlenecks into a regional mobility issue. Congestion hotspots were primarily concentrated along major commuting corridors, administrative boundary areas, commercial centers, and logistics routes connecting the five jurisdictions. Observations further revealed that many congestion locations were associated with cross-boundary travel demand rather than purely local traffic movements. The expansion of congestion into peripheral areas suggests increasing interdependence among jurisdictions within the metropolitan transportation system. In addition, traffic conditions at several boundary corridors indicated significant spillover effects from neighboring jurisdictions. These findings demonstrate that congestion in the KMBR exhibits characteristics of a metropolitan-scale phenomenon requiring regional rather than local responses. Consequently, the observed congestion patterns highlight the need for integrated governance mechanisms capable of addressing transportation issues across administrative boundaries.

Table 1. Distribution of Major Congestion Hotspots in the KMBR

Jurisdiction	Number of Hotspots
Bandung City	42
Cimahi City	31
Bandung Regency	35
West Bandung Regency	29
Sumedang Regency	31
Total	**168**

Characteristics of the Metropolitan Policy Network

Analysis of institutional arrangements revealed the involvement of multiple governmental actors in metropolitan traffic management. These actors included transportation agencies, regional development planning agencies, provincial government institutions, and supporting stakeholders involved in transportation-related activities. Despite the presence of a relatively dense policy network, governance interactions were primarily oriented toward operational coordination rather than long-term metropolitan planning. Interview findings indicated that the majority of coordination activities focused on responding to immediate traffic problems and short-term congestion management measures. Strategic discussions concerning regional mobility integration were considerably less frequent. Furthermore, institutional interactions were predominantly conducted through coordination meetings and information-sharing activities. Limited evidence was found regarding joint policy development, integrated transportation planning, or collaborative budget allocation. Resource-sharing mechanisms also appeared to be weak across jurisdictions. Consequently, policy coordination remained largely fragmented despite the existence of regular intergovernmental communication. These findings suggest that the metropolitan policy network functions primarily as an operational coordination mechanism rather than a fully integrated governance structure.

Table 2. Characteristics of Policy Network Governance in the KMBR

Policy Network Dimension	Empirical Findings
Actors	Multiple governmental agencies across five jurisdictions
Functions	Predominantly operational and technical coordination
Structure	Fragmented and jurisdiction-based
Institutionalization	Mostly informal and non-binding arrangements
Rules of Conduct	Limited standard operating procedures
Power Relations	Asymmetrical influence among jurisdictions
Actor Strategies	Dominance of local political and budgetary priorities

Institutional Fragmentation and Coordination Mechanisms

The analysis identified substantial institutional fragmentation across transportation governance arrangements in the KMBR. Each transportation agency operated primarily within its own administrative jurisdiction, with limited formal obligations to align transportation policies with neighboring regions. Coordination mechanisms were largely based on memoranda of understanding and informal agreements that lacked binding legal authority. Review of governance documents indicated that only a small proportion of regional coordination agreements were translated into enforceable local regulations. Furthermore, no formal sanctions were identified for jurisdictions that failed to comply with agreed transportation initiatives. The implementation of collaborative arrangements therefore depended heavily on voluntary participation and interpersonal relationships among government officials. Several participants reported that policy continuity was vulnerable to leadership changes and personnel rotation. As a result, many regional transportation initiatives experienced implementation delays or discontinuation. The absence of formal accountability mechanisms further limited the effectiveness of collaborative efforts. These findings demonstrate the existence of a fragmented institutional environment characterized by weak integration and limited regulatory enforcement.

Power Asymmetry and Actor Strategies

The findings reveal substantial asymmetries in influence and decision-making capacity among participating jurisdictions. Bandung City emerged as the dominant actor within the metropolitan transportation network due to its role as the primary economic and mobility center of the region. Several interview participants reported that transportation policies initiated by Bandung City frequently generated spillover effects in neighboring jurisdictions. In contrast, smaller

jurisdictions possessed more limited bargaining power in metropolitan coordination forums. Budget analysis further demonstrated that transportation investments were primarily directed toward locally visible projects rather than regional mobility initiatives. Less than a small proportion of transportation expenditures were allocated to projects generating explicit cross-boundary benefits. Local governments often prioritized short-term transportation interventions capable of producing immediate political visibility. Consequently, transportation strategies frequently reflected local administrative interests rather than collective metropolitan objectives. These conditions contributed to the emergence of actor strategies characterized by jurisdiction-centered decision making. The findings therefore indicate the prevalence of parochial policy behavior within metropolitan transportation governance.

Emergence of the Conflict Paradox

The results reveal the presence of a recurring pattern in which transportation interventions implemented within one jurisdiction generated unintended consequences in neighboring areas. Several cases demonstrated that localized congestion mitigation measures succeeded in improving traffic conditions within the implementing jurisdiction while simultaneously increasing congestion levels elsewhere. Such outcomes were particularly evident along administrative boundary corridors connecting Bandung City, Cimahi City, Bandung Regency, and Sumedang Regency. Interview participants consistently reported difficulties in synchronizing transportation policies across jurisdictions. Although coordination meetings occurred regularly, these interactions rarely resulted in binding regional commitments or integrated implementation strategies. Trust among participating institutions was found to be relatively limited, particularly when previous agreements failed to produce expected outcomes. Furthermore, the absence of a neutral coordinating authority reduced the effectiveness of collaborative governance processes. Consequently, transportation interventions often shifted congestion rather than reducing it across the metropolitan region. This recurring pattern forms the empirical basis of what this study identifies as the conflict paradox. The findings indicate that fragmented governance arrangements contribute significantly to the persistence of metropolitan congestion within the KMBR.

Discussion

The findings demonstrate that traffic congestion in the Greater Bandung Metropolitan Area (KMBR) is fundamentally a governance issue rather than merely a transportation engineering problem. The spatial distribution of 168 congestion hotspots across multiple jurisdictions indicates that congestion has evolved into a metropolitan-scale phenomenon characterized by high levels of interdependence among administrative areas. This finding supports previous metropolitan governance studies which argue that transportation problems increasingly transcend political boundaries and require integrated regional responses. Similar patterns have been observed in other metropolitan regions where fragmented governance structures have reduced the effectiveness of congestion management initiatives (Beghelli et al., 2020; Jiang et al., 2023; Kitchin & Moore-Cherry, 2021). The results further confirm that transportation interventions implemented within individual jurisdictions cannot adequately address congestion occurring across interconnected transportation networks. This finding is consistent with research emphasizing that urban mobility challenges emerge from both physical infrastructure constraints and institutional arrangements (Canitez, 2020; Creutzig, 2021; Karlsson et al., 2020; Patil et al., 2022). The observed congestion spillovers between Bandung City, Cimahi City, Bandung Regency, West Bandung Regency, and Sumedang Regency illustrate the complexity of metropolitan transportation systems. Unlike localized transportation problems, metropolitan congestion requires coordinated decision-making among multiple actors operating at different administrative levels. The persistence of congestion despite numerous traffic management initiatives suggests that technical solutions alone are insufficient without governance

integration. Therefore, the KMBR case reinforces the growing argument that effective transportation management depends on the capacity of governance systems to coordinate actions across administrative boundaries.

The analysis of policy network characteristics reveals significant evidence of governance fragmentation within metropolitan transportation management. According to Van Waarden's policy network perspective, effective governance networks should facilitate resource exchange, policy coordination, and collective problem-solving among participating actors. However, the findings indicate that interactions among transportation agencies in the KMBR remain largely operational and reactive rather than strategic and transformative. This condition resembles observations from previous studies on fragmented governance systems where coordination occurs frequently but fails to generate meaningful policy integration. Similar findings have been reported in metropolitan regions experiencing overlapping authorities and competing institutional mandates (Freemark et al., 2020; Oden & Sciara, 2020). The predominance of short-term technical coordination over long-term regional planning suggests that existing governance arrangements remain insufficiently institutionalized. Furthermore, the dependence on informal coordination mechanisms indicates weak structural integration among participating jurisdictions. Previous studies on policy fragmentation have similarly demonstrated that weak institutional linkages often reduce governance effectiveness and hinder collective action (Hattke & Martin, 2020; S. Y. Kim et al., 2022; Soujaa et al., 2021). The findings therefore support the argument that policy network fragmentation can limit the ability of metropolitan regions to address complex transportation challenges. Consequently, the governance network in the KMBR functions more as a communication platform than as an integrated mechanism for metropolitan mobility management.

The study also reveals substantial limitations in the implementation of collaborative governance within the KMBR. Ansell and Gash emphasize that successful collaboration depends on trust, commitment, shared understanding, and institutional arrangements that encourage collective action. Although coordination meetings occur regularly among transportation authorities, the findings indicate that collaboration remains largely procedural and does not consistently translate into integrated policy outcomes. This observation aligns with previous collaborative governance studies demonstrating that frequent interaction alone does not guarantee successful collaboration. Research conducted in various policy sectors has similarly shown that weak institutional design often undermines collaborative effectiveness despite high levels of stakeholder engagement (Christensen, 2024; Sanderink & Nasiritousi, 2020; Ukeje et al., 2026). In the KMBR, the absence of legally binding commitments appears to reduce accountability and weaken incentives for sustained cooperation. Trust among jurisdictions is also constrained by previous experiences of unilateral policy implementation and uneven distribution of transportation burdens. These conditions create an environment where actors prioritize organizational interests over regional mobility objectives. Similar governance challenges have been identified in cross-boundary governance research, where asymmetrical power relations often limit the effectiveness of collaborative arrangements. Therefore, the findings suggest that collaborative governance in the KMBR remains constrained by institutional weaknesses that prevent the emergence of genuine collective action.

One of the most significant contributions of this study is the identification and conceptualization of the conflict paradox as a governance phenomenon within metropolitan transportation systems. The conflict paradox refers to a condition in which localized interventions designed to reduce congestion unintentionally generate new transportation burdens in neighboring jurisdictions. This concept extends existing discussions on policy spillover effects by emphasizing the role of governance fragmentation in producing unintended regional consequences. Previous studies have documented the existence of spillover effects in transportation planning and regional governance; however, limited attention has been given to the institutional mechanisms that facilitate

their emergence (Zeng et al., 2024). The findings demonstrate that traffic management measures implemented within one jurisdiction frequently alter traffic flows across administrative boundaries, thereby redistributing rather than resolving congestion. This phenomenon is particularly evident when transportation policies are developed independently without consideration of regional mobility dynamics. Similar patterns have been reported in studies of metropolitan governance where local policy interventions generated adverse effects beyond their intended jurisdictions (Kitchin & Moore-Cherry, 2021; Moore-Cherry et al., 2022; Rauf & Weber, 2022). However, the present study contributes a more explicit governance-based explanation by linking these outcomes to fragmented policy networks and collaborative failure. The conflict paradox therefore provides a useful conceptual lens for understanding why metropolitan congestion persists despite ongoing traffic management efforts. Consequently, this concept offers both theoretical and practical value for future studies examining governance challenges in complex metropolitan regions.

The findings further highlight the importance of institutional design in determining the effectiveness of metropolitan transportation governance. The inability of existing regulatory frameworks to enforce regional coordination has contributed significantly to the persistence of fragmented governance arrangements. Previous studies on metropolitan governance have consistently emphasized the need for institutional mechanisms capable of coordinating policies across multiple jurisdictions. The KMBR case demonstrates that voluntary cooperation alone may be insufficient for addressing transportation challenges characterized by strong inter-jurisdictional dependencies. Similar conclusions have been reached in studies of metropolitan transportation authorities established in various international contexts, where stronger institutional mandates improved policy integration and coordination outcomes (Trein et al., 2021; van Geet et al., 2021). The absence of enforcement mechanisms in the current governance structure limits accountability and allows jurisdictions to prioritize local interests over regional objectives. This condition reinforces the emergence of parochial ego-sectoralism, which further weakens collaborative commitment among participating actors. The findings therefore support arguments advocating stronger forms of metropolitan governance capable of facilitating collective decision-making and coordinated implementation. From a policy perspective, the results suggest that institutional reforms should focus not only on improving communication among jurisdictions but also on strengthening legal authority, accountability mechanisms, and regional planning integration. Ultimately, effective metropolitan transportation governance requires governance arrangements that align local interventions with broader regional mobility objectives and long-term sustainability goals.

Implications

The findings of this study carry important theoretical and practical implications for the development of metropolitan transportation governance in decentralized administrative systems. From a theoretical perspective, the study extends existing policy network and collaborative governance literature by demonstrating that governance fragmentation not only weakens coordination effectiveness but also generates unintended inter-jurisdictional consequences manifested through the conflict paradox. The introduction of the conflict paradox provides a novel conceptual lens for understanding how localized policy interventions may unintentionally transfer transportation burdens across administrative boundaries rather than resolving congestion at the metropolitan scale. The findings also reinforce the argument that the effectiveness of collaborative governance depends not merely on the frequency of interaction among actors but on the existence of institutional arrangements capable of producing binding commitments and collective accountability. From a practical perspective, the study highlights the limitations of voluntary coordination mechanisms in managing highly interconnected metropolitan transportation systems. The persistence of congestion despite frequent coordination forums suggests that communication

alone is insufficient when institutional authority remains fragmented and enforcement mechanisms are absent. Consequently, metropolitan regions characterized by multiple autonomous jurisdictions should prioritize the development of integrated governance structures capable of aligning transportation policies across administrative boundaries. The study further emphasizes the importance of strengthening legal frameworks, coordination mandates, and accountability systems to reduce policy inconsistencies and improve regional mobility outcomes. Transportation planning agencies may also benefit from adopting cross-boundary impact assessments before implementing localized traffic interventions to minimize unintended spillover effects. In addition, the findings suggest that regional transportation strategies should be evaluated using metropolitan-wide performance indicators rather than jurisdiction-specific outcomes. The study therefore provides valuable insights for policymakers seeking to improve institutional coordination and promote sustainable urban mobility within rapidly growing metropolitan regions. Ultimately, the findings underscore the necessity of balancing local administrative autonomy with stronger metropolitan governance mechanisms to achieve more integrated, equitable, and sustainable transportation management.

Limitations and Suggestions for Future Research

This study has several limitations that should be considered when interpreting its findings and contributions. First, the research adopted a qualitative case study approach focusing exclusively on the Greater Bandung Metropolitan Area, which may limit the generalizability of the findings to other metropolitan regions with different institutional, political, and socio-economic characteristics. Second, the analysis primarily relied on interviews, regulatory documents, and field observations, making the findings dependent on participants' perspectives and the availability of institutional records. Third, while the study successfully identified patterns of policy network fragmentation and collaborative governance failure, it did not quantitatively measure the magnitude of their effects on traffic performance indicators such as travel time, traffic flow, or congestion severity. Fourth, the concept of the conflict paradox was developed based on empirical evidence from a single metropolitan context and therefore requires further validation across different governance settings. Future studies are encouraged to employ comparative research designs involving multiple metropolitan regions to examine the broader applicability of the proposed conceptual framework. Researchers may also integrate qualitative and quantitative approaches to evaluate the relationship between governance arrangements and transportation performance more comprehensively. Longitudinal studies would be particularly valuable for assessing how changes in institutional structures influence collaborative outcomes over time. Further investigation is also needed to explore the role of political leadership, fiscal capacity, and stakeholder participation in shaping metropolitan governance effectiveness. Additionally, future research could examine how digital governance technologies and integrated transportation data systems contribute to cross-boundary policy coordination. Comparative analyses between voluntary coordination models and legally mandated metropolitan authorities would provide deeper insights into alternative governance arrangements. The conflict paradox should also be tested in other policy domains, such as environmental management, land-use planning, and public service delivery, to evaluate its broader theoretical relevance. Ultimately, future research should continue to refine the understanding of governance mechanisms capable of promoting more integrated, accountable, and sustainable metropolitan management in increasingly complex urban regions.

CONCLUSION

This study concludes that traffic congestion in the Greater Bandung Metropolitan Area is fundamentally a governance challenge rooted in fragmented policy networks and ineffective

collaborative arrangements rather than solely a consequence of inadequate transportation infrastructure. The findings reveal that the metropolitan transportation system is characterized by dispersed authority, weak institutional integration, and limited alignment among the five jurisdictions responsible for regional mobility management. Although coordination activities occur regularly, collaboration remains predominantly procedural and lacks the binding commitments necessary to support effective metropolitan-scale transportation governance. The analysis demonstrates that existing policy networks function primarily as platforms for information exchange rather than mechanisms for collective decision-making and coordinated implementation. Structural fragmentation, informal coordination practices, and asymmetrical power relations further reduce the capacity of participating actors to address congestion in an integrated manner. The study also identifies the prevalence of parochial ego-sectoralism, whereby local governments prioritize short-term political and administrative interests over broader regional mobility objectives. As a result, transportation interventions are frequently designed to solve localized problems without adequately considering their metropolitan-wide consequences. This condition contributes to the emergence of the conflict paradox, a governance phenomenon in which congestion mitigation measures implemented within one jurisdiction unintentionally generate new transportation burdens in neighboring areas. The conflict paradox therefore provides a useful conceptual explanation for the persistence of congestion despite ongoing coordination efforts and repeated traffic management interventions. The findings further indicate that voluntary collaboration mechanisms are insufficient for managing highly interconnected metropolitan transportation systems characterized by strong cross-boundary dependencies. Strengthening institutional design through clearer mandates, stronger accountability mechanisms, and more integrated regional coordination structures is essential for improving metropolitan transportation governance outcomes. Ultimately, sustainable mobility within the Greater Bandung Metropolitan Area will require a transition from fragmented and voluntary coordination toward more coherent, accountable, and strategically integrated metropolitan governance arrangements.

AUTHOR CONTRIBUTIONS STATEMENT

Pringgo Dwiyantoro contributed to the conceptualization of the study, research design, methodology development, data collection, investigation, data curation, formal analysis, visualization, and preparation of the original manuscript draft. Deni Nugraha contributed to the refinement of the research methodology, validation of findings, supervision of the research process, and critical review and editing of the manuscript. Tuntun Salamatun Zen contributed to project administration, resource facilitation, academic supervision, interpretation of findings, and manuscript review and editing. All authors participated in the discussion of results, contributed to the development and revision of the manuscript, approved the final version for publication, and agreed to be accountable for all aspects of the work.

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