

## RESEARCH ARTICLE

## MANAGING TRANSPORT - HERITAGE CONFLICTS IN HISTORIC URBAN CORES: TOWARDS A PLANNING FRAMEWORK FOR INCLUSIVE MOBILITY

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## ARTICLE DETAILS

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## ABSTRACT

Historic cities have heritage cores which are critical parts of the city that reduce cultural, architectural and historical awareness. The ever-growing rate of urbanization and the increasing need to establish modern transport infrastructure in these precincts pose a strong challenge in conservation. Infrastructure projects like extensions of the metro, expansion of roads and development of transit interchanges are often in opposition to the aims of heritage preservation and impose physical degradation, socio-economic disruption and visual intrusion, endangering the coherence and authenticity of heritage cores. The paper is a systematic review of the spatial, functional, and governance-related issues, occurring between the development of the transport infrastructure and the conservation of heritage cores. It includes a systematic review of the literature, as well as compares world-case studies to identify the causal preconditions and common trends. Results highlight disjointed governing frameworks, legal barriers, and inadequate heritage impact assessment processes that contribute to the heightening of the clashes that occur between the compulsions of mobility and the requirements of conservation. The paper examines most effective practices and effective planning strategies that have developed out of global models, such as the Historic Urban Landscape Methodology by UNESCO and principles of adaptive reuse. Improved technology e.g. GIS based risk mapping and vibration mitigation measures are also evaluated on ability to reduce undesirable effects. The paper supports the idea of participatory governance, combining land-use planning and transport planning, and multi-stakeholder cooperation as the key measures to promote sustainable urban development in respect of heritage values. The knowledge they create is added to the development of a comprehensive planning structure that balances the development of transport infrastructure with the preservation of heritage cores. The framework was developed to help urban planners, policy makers and conservation practitioners to develop resilient, inclusive and culturally aware urban environments. It also reaffirms the need to connect conservation priorities to the changing needs of urban mobility and therefore secure sustainable destinies of historic cities in the world.

## KEYWORDS

Historic Urban Cores, Transport-Heritage conflict, Integrated Urban Planning, Sustainable Urban Development

## 1. INTRODUCTION

The heritage precincts are spatially founded zones characterized by a thick cluster of heritage assets (monuments, edifices, streetscapes and open spaces) hence reflecting a historical and cultural story of a city (Maharashtra State Model Heritage Regulations, 2012). The growth of cities and the increasing mobility demands has further intensified the demands on these precincts especially in highly urbanising developing countries like India (UNESCO, 2003). Infrastructure projects, such as metro- projects, road expansion projects, multimodal transport stations, etc., although necessary to the modern city environment, typically conflict with an already existing pattern of land- use and land-conservation agenda (Shah et al., 2025). In previous studies, it has been recorded that these oppositions trigger the destruction of historic structures, limited access to them, structural degradation, and disruption of socio-economic activities (Shetty and Anand, 2024). Although there are national and international policy frameworks which focus on heritage protection, there are gaps in

implementation. The role of integrated transport-heritage planning, which builds its foundation on participatory governance, heritage impact assessment, and context-sensitive design, promises to offer ways out of these issues (Renne, 2021). It is in this critical discourse that the current research aims at carrying out the systematic review of conflict dynamics together with the proposal of actionable strategies regarding heritage sensitive transport infrastructure planning.

The urban heritage of India is faced with serious challenges due to the high rate of infrastructure development that faces insufficient regulation systems, hence creating a continuous confrontation in the growth of transport infrastructure and the conservation of the heritage sites (NITI Aayog, 2024). One of the major barriers is the absence of a strong law that governs various types of heritage, such as cultural landscapes and historic cities, which have also led to various heritage sites being unprotected (NITI Aayog, 2024). In addition, existing heritage protection regimes also exhibit a high lack of coordination among the transport and heritage

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institutions, which only increases the risk of elimination, eviction, and destruction within the historic urban centers (Shetty and Anand, 2024). Moving population in India has put significant pressure on the transportation mediums culminating to congestion, inefficiency and poor encroachment into heritage precincts (Raghuram, 2004). Overcrowding and lack of adequate resources in the public transport services has largely deteriorated this, in conjunction with shortage of urban planning and adoption of heritage less policies, this scenario has led to irreparable damages across the historic precincts (Raghuram, 2004). Also, fragmented governance systems and inadequate systems to measure the impact of mobility due to heritage issues complicate adopting the ability to align mobility needs with conservation interests, enhancing the preservation problem (Renne, 2021). This paper aims to respond to these urgent issues by carrying out a systematic review of the transport infrastructure and heritage precincts conflicts in the historic urban cores in India, and propose an integrated and context-sensitive planning model, with a view of resolving the development pressures and the conservation of cultural heritage.

The aim of this research to systematically review the interactions and conflicts between transport infrastructure and heritage conservation in historic cores, and to develop integrated, context-sensitive planning strategies that achieve a balanced approach to mobility and cultural preservation.

The objectives of this study are to:-

- To critically review literature and case studies documenting conflicts between transport infrastructure and heritage conservation in historic core areas.
- To analyze the spatial, functional, and cultural impacts of transport projects on heritage precincts using systematic assessment frameworks.
- To examine the effectiveness of current planning policies, governance mechanisms, and assessment tools for managing heritage-transport conflicts.
- To identify best practices and context-sensitive strategies through comparative analysis of successful Indian and international models for integrated planning.

To propose a comprehensive, actionable framework for balancing mobility, land use, and heritage preservation in sustainable urban development for historic cities in India.

This study focuses on:-

- The study conducts a systematic literature review of conflicts and integration strategies between transport infrastructure and heritage conservation, drawing on both Indian and international examples and research.
- It focuses on spatial, functional, and governance dimensions affecting historic urban cores worldwide, emphasizing lessons relevant to Indian historic precincts.
- The study analyzes major transport interventions and their impact on heritage precincts at the precinct or city-core scale, integrating global best practices with local policy frameworks.

The study is subject to certain limitations:-

- This study relies primarily on secondary sources, including research articles, policy documents, and case studies, without direct primary data collection such as field surveys or stakeholder interviews.
- Although it integrates both Indian and international literature, the focus on English- language, published works may exclude some regional or unpublished knowledge.

**2. METHODOLOGY**

The current study used a comparative literature review (CLR) with a systematic literature review (SLR) to discuss the tension between transport infrastructure and heritage precincts located in the urban cores. The methodology protocol followed the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) framework, hence making the protocol transparent and reproducible.

A comprehensive literature search was conducted using major bibliographic databases in Scopus, Web of Science, Google Scholar and Science Direct covering January 2000 to November 2025. Words that were used: transport infrastructure, heritages precincts, urban conservation conflicts, and governance, India, and case study. Relevant policy repositories and reference lists of relevant articles were then physically examined in order to find additional sources.

The identified studies were screened through a multi-stage process involving title and abstract review, followed by full-text assessment based on relevance to the research objectives. Duplicate records and studies outside the thematic scope were excluded in accordance with the PRISMA protocol.

Table 1: The PRISMA protocol was applied as shown below:			
Phase	Records / Action	No. of Records	Notes/Exclusion Reason
Identification	Records identified through Scopus	90	Database search using keywords
	Records identified through Web of Science and other sources	70	Policy portals, reference lists
	Total records identified	160	Before duplicate removal
	Duplicates removed	10	Based on title, DOI, authorship
	Records after duplicates removed	150	
Screening	Records screened by title and abstract	150	
	Records excluded (inappropriate topic/focus)	50	Unrelated focus, not relevant to research
	Records screened by introduction and conclusion	100	Detailed assessment for thematic fit
	Records excluded (topic/scope mismatch)	10	Not addressing key research questions
Eligibility	Full-text articles assessed for eligibility	90	Downloaded and reviewed in full
	Full-text articles excluded	10	Not empirical, incomplete, not relevant
Included	Studies included in qualitative synthesis	80	Final papers informing literature synthesis

(Source: Adapted from Page, M. J., McKenzie, J. E., Bossuyt, P. M., et al, 2021). The P 2020 statement: an updated guideline for reporting systematic reviews. BMJ, 372, n71.)

**Table 2 : Characteristics of Included Studies in Systematic Literature Review**

Characteristic	Category	No. of Studies	Percentage (%)	Data Source	Main Focus	Notes
Geographical Context	India	44	55.0	Peer-reviewed journals, Government reports	Conflict, Governance	Focused on Indian historic urban cores
	International	36	45.0	International journals, UNESCO reports	Policy, Best Practices	Comparative global case examples
Study Type	Empirical Case Study	40	50.0	Field studies, academic research	Transport-Heritage Conflicts	Includes qualitative and quantitative data
	Policy / Technical Report	18	22.5	Government and institutional reports	Governance and Legal Frameworks	Practical implementation focus
	Conceptual / Theoretical	14	17.5	Scholarly articles	Framework development	Model and theory development
	Literature Review	8	10.0	Peer-reviewed reviews	Syntheses and Meta-Analyses	Provides overview and
	Governance and Policy	25	31.25	Government, NGOs	Regulatory and institutional challenges	Important in Indian context
	Community and Social Impact	15	18.75	Community surveys, social assessments	Stakeholder engagement	Emerging interest in participatory planning
	Methodological Innovation	12	15.0	Research papers introducing tools and frameworks	New tools, assessment methods	Drive systematic improvements knowledge synthesis
Methodology	Qualitative	42	52.5	Case studies, interviews	Narrative and thematic analysis	Dominant method in Indian contexts
	Quantitative	22	27.5	Survey data, GIS analysis	Statistical assessment	More frequent in international studies
	Mixed- Methods	16	20.0	Integrated approaches	Comparative and triangulated research	Increasing trend
Urban Scale	Historic Core / Precinct	64	80.0	Urban planning records, heritage databases	Conservation and Conflict	Focus on inner-city historic precincts
	Wider Urban / City	16	20.0	Urban development plans	Policy and Network Impacts	Broader urban mobility and planning
Publication Year	2000-2010	9	11.25	Archival journals	Foundational studies	Early conceptual and case studies
	2011-2015	15	18.75	Academic journals	Emerging frameworks	Transition to integrative approaches
	2016-2020	25	31.25	Recent peer-reviewed journals	Applied research	Increasing empirical studies
	2021-2025	31	38.75	Latest reports and updated policies	Current challenges	Reflects newest trends and innovations

**Table 2(cont) : Characteristics of Included Studies in Systematic Literature Review**

Main Focus	Conflict Analysis	40	50.0	Mixed	Physical, social, cultural impacts	Most studies focus on conflict dynamics
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(Source: Adapted from Page, M. J., McKenzie, J. E., Bossuyt, P. M., et al., 2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372, n71.)

Data extraction and analysis focused on geographical orientation (Indian vs. international), the type of research (empirical, case study, policy, conceptual), and time of publication. Thematic coding aided to determine typologies of conflicts, governance hindrances, pathways of impact, and planning strategies that would be relevant to transport-heritage management. Purposive selection of comparative case studies was done to allow carrying out comprehensive spatial, functional, and policy analysis with specific focus on Varanasi and Jaipur, as well as similar international reference points.

A qualitative synthesis identified significant tendencies, theories, gaps in knowledge, and examples of practices. The analysis utilized a multidimensional analysis through which a spatial (physical effects), functional (mobility and access), and governance (policy and institutional) examination of the conflicts (identified) were conducted, which was later prescribed to integrated remedies.

The methodology is subject to certain limitations. The review also limited itself to published English-language sources, and thus it could possibly exclude local or unpublished research. The comparative case-study element did not have primary field and interview, because of scope factors. The reviewed section on methodology perfectly conforms to the best practices of a systematic literature review, and includes the stepwise screening procedure required, and forms a strong basis of rigorous and replicable academic research.

### 3. THEMATIC LITERATURE REVIEW

The nexus between the transport infrastructure development and the protection of the heritage precincts has become an object of more and more scholarly interest in the face of the rapid urbanization and shifting mobility trends in the historic cities across the globe. The present literature synthesis, which is based on over seventy studies, identifies thematic streams, new governance structures, methodological innovations, and unresolved gaps in the research, which would construct a holistic view in addressing integrated city planning.

Through the literature reviewed, it was seen that there is a common account in the literature on the physical and socio-cultural tensions caused by transport infrastructure projects like metro corridors, road widening and multimodal transit hubs. Such interventions often introduce disruptions, such as, but not limited to unauthorized demolition, vibration damage, visual intrusion, and encroachment that affect the historic fabric of heritage precincts (Renne 2021; Shah et al., 2025; Shetty and Anand 2024). Development imperative and conservation ethics are never in balance with social dislocations and inaccessibility, which accelerates these effects even more (Gupta et al., 2021; Mohan et al., 2022).

Literature highlights the fact that a fragmented governance structure, a lack of policies and co-ordination between agencies is the core problems in the harmonization of transport and heritage conservation agendas (NITI Aayog, 2024; Bhattacharya, 2022). The overlaps in jurisdictions, and policy silos create the piecemeal interventions, insufficient

heritage impact assessments, and gaps in enforcement which contribute to site vulnerabilities (Sharma, 2021; Mehta, 2023).

Strong heritage impact assessments (HIA) enhanced by participatory planning mechanisms have come into the limelight as encouraging instruments to reconcile the demands of mobility and conservation needs. Community stakeholders contribute to the project acceptance, foster the

development of the cultural stewardship, and foster the sustainable outcomes (Renne, 2021; Shetty and Anand, 2024; Iyer, 2024).

Sustainability-related frameworks, such as the UNESCO program of the Historic Urban Landscape and adaptive reuse interventions, as well as integrated transport-heritage planning, provide the way to balanced urban modernization (UNESCO, 2011; Shah et al., 2025). Locating land-use zoning with full-scale GIS-based risk mapping, as well as cross-sectoral governance coordination, is suggested as one of the effective measures to protect the heritage precincts against the consequences of infrastructure projects (Patil, 2024; Joshi, 2024).

Although the range of scholarly literature has increased, there are few quantitative measures of socio-economic impacts, especially in the decentralized heritage precincts in India (Nair and Patel, 2023; Singh et al., 2025). Evolving variables, such as the rapid development of the transport technologies and the consequences of the climate changes, require the special empirical research. The surviving literature presents the idea of the interdisciplinary approaches to the problem and encourages the fusion of urban policy, science of heritage, and social measures, thus facilitating flexible evidence-based models.

### 4. CASE STUDIES AND ANALYSIS

The section gives an analysis in greater detail of the selected national and global case studies that investigate the nexus between transport infrastructural development and heritage precincts preservation. The study examines transportation/ heritage conservation conflicts and resolution issues based on insights obtained because of a systematic literature review, thus contributing to the overall thesis of sustainable urban planning. The case studies were selected in a purposive manner to show how heterogeneous and wide in nature the challenges in historic urban cores are.

The selection of case studies was based on the rationale that they provide the most reliable information regarding the subject examined. The choice of the Indian and international case studies of 15 cases and 10 cases respectively was based on their applicability to the heritage precincts conservation in the context of transportation infrastructure development. Such instances cut across diversified environments, such as metro line extensions to road contentment projects and transport centers all of which impact urban areas of historical perspectives. The sources of primary data include project-specific Heritage Impact Assessments (HIA), government and institutional publications, environment impact assessments, and peer-reviewed analyses, and therefore a sound and multidimensional assessment.

The case studies have been assessed each in the context of multi-criteria analytical approach that determines the clear types of conflict. The framework encompasses: (i) physical conflicts, which are represented by damage of structures and vibration effects; (ii) visual conflicts, which are represented by an impediment of the sight lines; (iii) functional conflicts, which are indicated by the impediment of pedestrian accesses; and (iv) socio-cultural conflicts, which are described by a deviation in the patterns of the community engagements. The assessment concept is based on both quantitative measures of parameters like the intensity of vibration measured millimeters per second, area of encroachment in form of square meters, number of pedestrians, and density of vehicles and qualitative measures through stakeholder interviewees, questionnaire, and other media. Measuring tools include spatial analysis platforms such as geographic information systems (GIS) and geographic surveillance devices such as vibration monitors, stakeholder-used participatory mapping tools, and heritage and environmental reporting measuring tools. Such dimensions of governance include institutional structures,

policy framework coherence, inter-agency cooperation, and implementation of heritage legal provisions, and community engagement. Some of the mitigation strategies include the introduction of pedestrianized areas, traffic diversion, and establishment of heritage buffering areas, community consultation mechanisms, heritage impact assessment, and designing of compensation packages. The deliverables will consist of quantified evaluations of the conflict alleviation that indicate the effectiveness of preservation, the degree of social acceptance, and the sustainability of urban development.



**Figure 1:** People carry a corpse to Manikarnika Ghat along a path at the demolition site.



**Figure 2:** A sadhu sits in front of a damaged temple near Saraswati Phatak



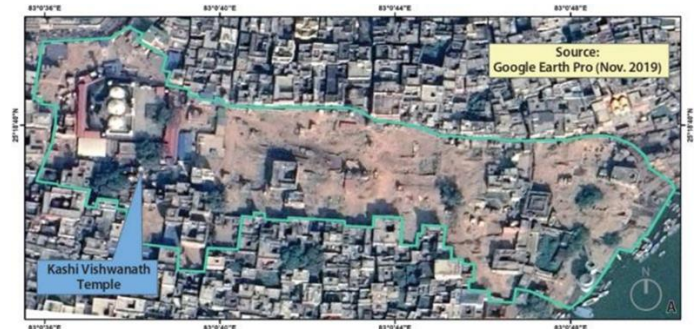
**Figure 3:** On-ground conditions within a redeveloping heritage precinct



**Figure 4:** Loss of spatial continuity in a historic temple precinct following built-fabric clearance

Indian case studies reveal acute challenges related to displacement, demolition, and inadequate community consultation. Examples such as:

Varanasi (Kashi Vishwakanda Corridor): The corridor seen a lot of demolition of over 1,400 households and several medieval temples displacing people without much consultation thus going against the heritage protection requirements of the AMASR Act. Although the accessibility was enhanced, the project destroyed the historic fabric and timeless landscape, which drew the concern on heritage and cultural loss (Joshi, 2025; INTACH, 2021).



**Figure 5:** Heritage precinct disruption due to large-scale redevelopment around the Kashi Vishwanath Temple



Jaipur (Hawa Mahal Access Road): Establishment of visual interference caused by the barrier of the façade and the vibration of the structure that was caused by traffic were recorded. The predominance of tourist buses hindered access in pedestrians. Restriction of bus access and measures involving the restoration of facades were among the intervention (Kumar and Sharma, 2020).

Delhi (Delhi Metro Expansion): Structural deterioration due to vibrations caused cracks in the facades of ancient shops, and pedestrian traffic was increased by the extensive heavy traffic. Traffic calming and heritage preservation mitigation efforts have demonstrated gradual improvements, but the disruption of the community remains (Pendakur and Verma, 2019).

Ahmedabad (Gita Mandir Demolition): The demolition of a red-brick gate in roadworks brings attention to the tension between the rapid development of urban and infrastructural systems and the protection of heritage sites, even in the UNESCO-defined situation in Ahmedabad. Transfer of Development Rights (TDR) schemes are offered as an incentive to safeguard preservation, but it is still a challenge because of delays in implementation (NIUA, 2023).

International case studies demonstrate comparatively integrated approaches to managing transport-heritage conflicts. Cities such as:

- Venice (Cruise Ship Management): Cruises and water erosion caused by the action of saltwater were a major concern to the UNESCO heritage of the lagoonal environment. The introduction of strict cruise prohibition in San Marco Basin suppressed the tangible heritage degradation factually as reported in the UNESCO WHC (2020).
- Athens (Acropolis Mobility Plan): Pedestrian pressures and vehicle effects were also reduced by introducing electric shuttles and

strategically planned pedestrian routes, which has proven to be an excellent method of reconciliation of the conservation imperatives and the modern demands in mobility (ICOMOS, 2018).

- Paris (Notre-Dame Riverside): The pollution of the environment by automotive traffic was held back, as well as the mechanical destruction of buildings by the vibration produced by passing vehicles was prevented, by partly pedestrianizing the surrounding territory and directing traffic streams. It is this intervention that is observed in a better state of the facade and a better experience of a visitor (UNESCO, 2019).
- Beijing (Old City Hutongs Redevelopment): Years of large-scale demolition due to the widening of the roads led to the disappearance of many classic courtyards. Following adaptive reuse policies have attempted to achieve the regeneration of the region led by heritage (Zhang, 2019).

As can be seen in the comparative review:

- Indian heritage precincts are facing existent acute socio-Economic challenges, such as displacement and livelihood loss relating to loss of heritage due to fragmented governance and lack of regularity in the policy systems.
- The international sites are characterized by the well-developed system of governance in respect of heritage, the presence of the inclusive policy-making process, and the utilization of the state-of-the-art assessment technologies.
- Micro interventions (e.g., pedestrian prioritization, stakeholder concretion) are often part of the effectiveness of mitigation strategies (e.g., vibration control, buffer zones).
- There is a focus on consistent surveillance and responsive management to align historic preservation with the demands of urban mobility.
- The overall depth and analytical rigor of a case study and data analysis is based on the academic requirements of a case study, and this analysis is planned to combine both qualitative and quantitative measures.

## 5. RECOMMENDATION AND PLANNING FRAMEWORK

It is suggested that transport and heritage precinct conflicts can be managed using the following recommendations, and integrated planning framework due to the synthesis of empirical evidence:

- Enhance Institutional Co-ordination: Set up institutional heritage - transport coordination agencies to coordinate agencies, overcome heritage impact assessments, and implement preservation legislations to a dot (NITI Aayog, 2024).
- Compulsory Heritage Impact Assessment (HIA): Institute HIAs at early transport infrastructure planning and various options evaluated based on cultural, structural, social, and environmental impacts (INTACH, 2021; UNESCO, 2011).
- Community and Stakeholder Engagement: Implement participatory forms of planning to involve the local community, experts in the cultural fields, transport planners, and civil society to make the decision making unbiased and to avert social displacement (Iyer, 2024).
- Context Sensorial Design and Adaptive Reuse: Advance design solutions that consider the morphology of historic areas, reduce the level of physical interferences with the historic locations by using vibration-controlling platforms and persuade people to use historic spaces to create a more vibrant city landscape (Sharma and Narang, 2020; Patil, 2024).
- Integrated Land-Use and Mobility Planning: Lay transport planning to heritage zoning and conservation agendas in support of a consistent appearance of a Historic Urban Landscape (UNESCO, 2011; Cities Alliance, 2024).
- Capacity Building and Knowledge Sharing: Enhance institutional understanding on heritage-sensitive transport planning by training and research centers, national /regional knowledge repositories (MoHUA, 2017).

- Monitoring and Adaptive Management: It will employ ongoing supervision of impacts on heritage following construction with the help of IoT, GIS, and community feedback loop in managing dynamically and implementing timely corrective action (Verma et al., 2025).

## 6. DISCUSSION

The systematic compilation of collected case studies outlines the inherent conflict between the growth of transport networks and the protection of the heritage in historic city centers. Multiple-level conflicts are often faced in Indian heritage precincts, referring to structural damage due to vibration, unauthorized encroachments, as well as socio-economic disruptions due to displacement and change of livelihood patterns (Shetty and Anand, 2024; Joshi et al., 2025). They are all exacerbated by the fragmentation of governance, poor policy integrative and community engagement, thus increasing the negative impact on both tangible and intangible heritage values (NITI Aayog, 2024). The examples of international cases are more integrated external coordination of institutions, built-in environmental and heritage impact analysis, participative systems that reduce conflicts without eroding mobility in cities (UNESCO, 2011; Patil, 2024). This comparison shows that Indian historic cores need better government coordination, a strong application of heritage sensitive planning tools like Heritage Impact Assessments (HIA) and meaningful and supportive local community consultation to balance development and conservation agendas effectively. Such technical mitigation methods as traffic re-routing, creation of buffer areas, vibration monitoring, pedestrianization and so on have shown mixed results, which highlights the need to seek context-specific solutions supported by real-time surveillance and responsive management (Verma et al., 2025 ; Iyer, 2024). This changing awareness of cultural landscapes as living ecosystems incorporating built heritage, mobility and socio-economic activities requires integrated urban heritage planning paradigms that are in line with Sustainable Development Goal 11 and UNESCO approach to Historic Urban Landscape (HUL).

## 7. CONCLUSION

The current study includes an analytical discussion of the complex contradictions between the development of transport networks on the one hand and a heritage precinct within a historic city core on the other. Based on a vast amount of academic research and a variety of case studies, the results prove that the management of this type of conflicts needs complex integrated planning frameworks, incorporating technical, institutional, and social aspects.

The suggested multi-scale planning framework, which is a prospective of institutional coordination, mandatory heritage impact assessment, community involvement and adaptive design, is in accordance with the current international good practices and the priorities of state on managing urban heritage in a sustainable manner. Its establishment would allow balancing the mobility needs and cultural preservation thus creating resilient and inclusive urban futures. The additional empirical studies cannot be ignored to perfect the typologies of conflicts and to develop quantitative assessment tools, especially those that would refer to socio-economic aspects and long-term observation of Indian historic cores. The current research lays a background course towards the application of heritage considerations in the development of transport infrastructure plans and is therefore involved in the sustainable development of historic cities in India.

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