



Cultural Infrastructure as Comparative Urban Metrics: A Scoring Framework for Indian Context Inspired by the Global Cultural Planning Models

Urjjasee Basak¹, and Dr. Arjun Mukerji²

¹ Postgraduate student, Masters in City Planning, Indian Institute of Technology, Kharagpur, India

² Associate Professor, Department of Architecture and Regional Planning Indian Institute of Technology, Kharagpur, India

Abstract

Culture is increasingly acknowledged as a driver of urban vitality and social well-being. Yet, Indian urban planning still lacks systematic knowledge frameworks to measure and integrate cultural infrastructure into planning processes. This research introduces an interdisciplinary **Cultural Scoring Framework** that synthesizes cultural metrics, planning theory, and spatial analysis to create a new evidence base for cultural planning in data-scarce cities. The main argument advanced in this study is that cultural infrastructure can be governed and planned only when it becomes measurable, comparable, and spatially interpretable through indicators that reflect local cultural realities. The scope of the research is twofold: (1) to develop a multi-dimensional evaluation framework based on internationally established models—including the Cultural and Creative Cities Monitor, London's Cultural Infrastructure Plan, UNESCO's Culture 2030 Indicators, etc. and (2) to operationalize the framework in the context of Indian cities to reveal inter-urban and intra-urban disparities in cultural provisioning. The methodological approach follows four sequential stages: identification of culturally resonant indicators; clustering of indicators into thematic sub-indices; prioritization through the Analytic Hierarchy Process (AHP); and computation of a two-tier scoring system that yields indicator-level and aggregated cultural infrastructure scores. Applied to the **Kolkata Metropolitan Area**, the framework tends to uncover significant spatial differences in access to cultural resources between historic cores and peripheral urban local bodies. The contribution of this research lies in demonstrating how **hybrid knowledge systems**—combining cultural studies, urban analytics, and governance theory—can reshape the epistemological bases of planning. By producing a transferable and data-efficient methodology, the study positions culture as a quantifiable and governable dimension of urban development, offering a tool that other Global South cities can replicate to bridge longstanding gaps between cultural knowledge and planning practice.

Keywords: Culture led development; Interdisciplinary metrics; Urban vitality

1. Introduction

Urban development is traditionally measured in terms of physical infrastructure—roads, housing, sanitation, and utilities—while cultural infrastructure often receives limited attention. Cultural infrastructure includes spaces such as theatres, galleries, museums, libraries, auditoriums, cultural precincts, and creative workspaces. These facilities not only provide avenues for artistic expression but also contribute to social cohesion, community engagement, heritage preservation, and economic development (Hosagrahar et al., 2019). Globally, cities that strategically integrate culture into urban planning demonstrate higher quality of life, economic vitality, and international competitiveness. For example, London's Cultural Infrastructure Plan and Hong Kong's Creativity Index show that systematic cultural planning fosters both cultural vibrancy and sustainable urban development (Greater London Authority, 2019; University of Hong Kong, 2014).

In the Indian context, however, cultural infrastructure has been largely overlooked in metropolitan planning. Cities like Kolkata and Delhi boast rich cultural legacies, yet most investments are concentrated in certain central districts, leaving suburban and peripheral areas underserved. Moreover, urban policies prioritize transport, housing, and economic infrastructure over cultural amenities (UNESCO, 2019). This uneven development restricts public access to cultural resources, diminishes the potential for inclusive cultural participation, and underutilizes urban spaces as nodes of creativity. Against this backdrop, this study proposes a multi-dimensional, indicator-based framework to measure, compare, and spatially interpret cultural infrastructure within an Indian metropolitan context. By adapting international models to local conditions, the research seeks to reposition cultural infrastructure as a measurable and integral component of urban planning and governance.

2 . Research Problem

The lack of a structured methodology for cultural infrastructure planning in India creates several challenges. First, there is **no standardized framework** for evaluating existing cultural assets, mapping their accessibility, or ranking their socio-cultural impact. Internationally, frameworks such as the American Creativity Index, European Creativity Index, and UNESCO Culture 2030 Indicators provide both quantitative and qualitative measures to benchmark cultural performance (Staniulytė, V. (2018).; Eurostat, 2019; Hosagrahar et al., 2019). Second, in the Kolkata Metropolitan Development Authority (KMDA) region, cultural infrastructure is heavily centralized in Kolkata city, while other municipalities such as Howrah, Bidhannagar, and Chandannagar have limited resources and planning mechanisms. This imbalance affects both the equitable distribution of cultural amenities and the holistic growth of the metropolitan area. Finally, the absence of user-centric evaluation tools and impact metrics means that planning decisions often overlook the needs and preferences of communities, further weakening the cultural ecosystem (Montalto et al., 2019).

Finally, the absence of a composite index or scoring system for cultural infrastructure prevents comparative assessment across cities or urban regions. This limits the ability to identify gaps, prioritize interventions, and develop targeted strategies for cultural development.

In this context, the research problem can be articulated as follows:

How can a replicable, multi-dimensional, and context-sensitive methodology be developed to assess, quantify, and guide the planning of cultural infrastructure in Indian metropolitan regions?

Addressing this problem requires the integration of international best practices with locally relevant indicators, the incorporation of both quantitative and qualitative dimensions, and the development of a framework that supports evidence-based planning and policy formulation. Based on these research questions, the study tests the following hypotheses:

H1. Municipal corporations with higher composite Cultural Infrastructure Index (CII) scores exhibit stronger levels of cultural participation and socio-spatial vitality.

H2. Cities demonstrating balanced performance across multiple cultural domains achieve greater overall cultural vitality than cities performing strongly in only one or two domains.

H3. A cultural infrastructure assessment framework adapted from international models provides a reliable and transferable methodology for comparative urban planning in the Indian context.

3. Study Area

This study focuses on four municipal corporations within the Kolkata Metropolitan Area (KMA): Kolkata, Howrah, Bidhannagar, and Chandannagar. These cities were chosen due to their diverse size, historical roles, and variations in cultural infrastructure provision. While Kolkata serves as the region's cultural hub, the other municipal corporations display significant diversity in their access to, and investment in, cultural venues and services.

A comparative study across these cities allows for in-depth analysis of existing strengths and identification of service gaps, informing strategies for balanced regional development. This is particularly important given the limited formal policy attention or spatial interventions regarding cultural infrastructure outside of Kolkata. Figure 0-1 shows the geographical locations of the study area and Table 3-1 shows the data about the study area.

Table 3-1 :Study area details

City	Population (2011 Census)	Historical Significance	No. of Recognized Cultural Venues	Total Area (sq km)
KMC (Kolkata Municipal Corporation)	4,496,694	Colonial capital	High	185.0
HMC (Howrah Municipal Corporation)	1,722,006	Steel/Industrial town	Medium	55.0
BMC (Bidhannagar Municipal Corporation)	629,107	Planned new town	Low	62.5
CMC (Chandannagar Municipal Corporation)	166,867	French colonial	Low	19.5

Source: Census 2011, district/city/municipality websites

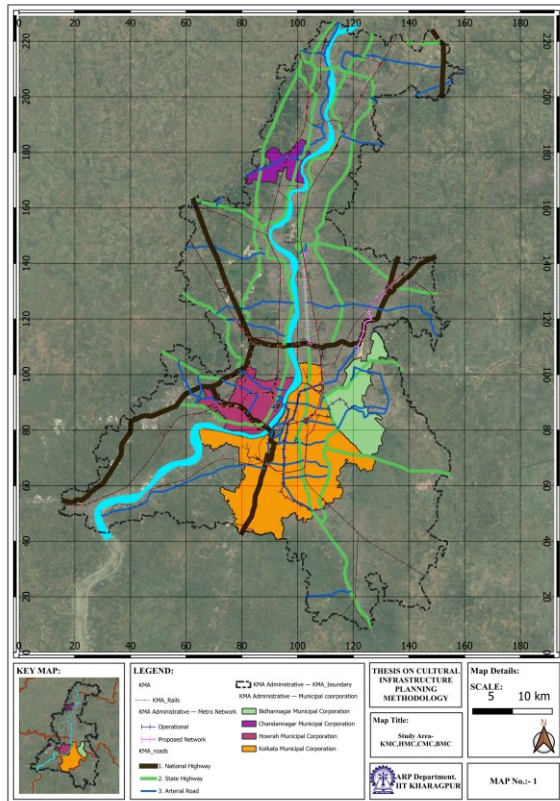


Figure 0-1: Study Area Map

Source: Author

3.1 Scope of Study

The study focuses on four municipal corporations within the Kolkata Metropolitan Area (KMA)—Kolkata Municipal Corporation (KMC), Howrah Municipal Corporation (HMC), Bidhannagar Municipal Corporation (BMC), and Chandannagar Municipal Corporation (CMC). These municipalities were purposively selected because they represent contrasting historical evolution, governance structures, settlement morphology, and cultural characteristics while being the only 4 municipal corporations of a common metropolitan region.

The analysis utilizes the most recent publicly available secondary datasets together with primary household and stakeholder surveys conducted during November 2025 to January 2026. The study is intended as a comparative assessment of metropolitan cultural infrastructure rather than a comprehensive evaluation of all municipalities within West Bengal. Consequently, the findings should be interpreted as representative of diverse metropolitan typologies rather than statistically representative of all Indian cities.

Beyond developing a comparative assessment framework, the study aims to generate practical planning outputs that can support evidence-based cultural governance. The proposed Cultural Infrastructure Index (CII) enables municipal authorities to benchmark cultural performance, identify domain-specific deficiencies, prioritize infrastructure investments, and integrate cultural considerations into statutory master plans and development strategies. By transforming cultural infrastructure into measurable planning indicators, the framework also provides a basis for periodic monitoring, inter-city comparison, and more equitable allocation of cultural resources within metropolitan regions.

4. Literature Review

4.1 Global Frameworks for Measuring Cultural Systems

Early attempts to quantify urban creativity are rooted in the American Creativity Index, which conceptualizes creativity through the interaction of **technology, talent, and tolerance**. This framework establishes a strong link between cultural ecosystems and economic competitiveness, arguing that cities with higher concentrations of creative professionals and inclusive social environments demonstrate greater innovation capacity. However, its emphasis remains largely **economy-centric**, with limited engagement with cultural participation, heritage, or equity—dimensions critical in non-Western contexts.

In contrast, the European Creativity Index adopts a broader, multi-dimensional approach by incorporating **cultural participation, institutional support, and social diversity** alongside economic indicators. This shift is further advanced by the Cultural and Creative Cities Monitor, which structures cultural assessment across three pillars: **cultural vibrancy, creative economy, and enabling environment**. Unlike earlier indices, it explicitly integrates governance, accessibility, and participation, offering a more **holistic representation of urban cultural systems**.

A key insight across these frameworks is the distinction between:

“Hard” infrastructure (venues, facilities) and **“Soft” dimensions** (participation, governance, social inclusion). This distinction is particularly relevant for adapting global models to contexts where informal and community-based cultural practices dominate.

4.2 Global South Perspectives

Frameworks emerging from the Global South provide important methodological shifts by recognizing **informality, social capital, and policy gaps**.

The Hong Kong Creativity Index expands the measurement of creativity to include **cultural capital, social capital, and institutional capital**, explicitly incorporating **participation rates, cultural expenditure, and informal engagement**. This makes it more adaptable to cities where cultural activity extends beyond formal institutions. Similarly, the Chinese Creative City Index and Chinese Urban Creativity Index introduce **multi-layered indicator systems** capturing production, demand, support systems, and industrial impact. These frameworks emphasize **state-led policy, infrastructure investment, and cultural industry performance**, reflecting a more **institution-driven model of cultural development**.

4.3 Culture in Sustainable Development

UNESCO positions culture as a cross-cutting driver of sustainable development, structured across four domains: **environment & resilience, prosperity & livelihoods, knowledge & skills, and inclusion & participation**. Unlike creativity indices focused on competitiveness, this framework emphasizes **equity, access, and long-term sustainability**. It expands the scope of cultural assessment by linking:

- Cultural infrastructure to **urban resilience and environmental planning**
- Cultural participation for **social inclusion and rights**
- Creative industries to **livelihoods and economic development**

This makes it particularly relevant for integrating cultural planning within broader urban policy frameworks.

4.4 Synthesis and Research Gap

A synthesis of global literature reveals three key gaps:

1. **Overemphasis on Economic Metrics**

Many indices (e.g., American Creativity Index) prioritize economic output while underrepresenting participation and social value.

2. **Limited Attention to Informality**

Informal cultural practices—central to cities in India—are largely excluded from global frameworks.

3. **Weak Integration of Infrastructure and Usage**

Existing models often measure either provision (infrastructure) or output (economy), but rarely examine the link between availability and actual engagement.

This study addresses these gaps by developing a **multi-dimensional cultural infrastructure index** that integrates:

- Physical infrastructure
- Economic performance
- Social and spatial dynamics

5. Case Studies

5.1 International Case Studies

The London Cultural Infrastructure Plan (London CIP, 2019) demonstrates a planning-led approach to cultural infrastructure, emphasizing spatial mapping, protection of cultural assets, and integration with land-use planning. A key contribution is the distinction between:

- **Consumed spaces** (theatres, museums), and
- **Produced spaces** (studios, rehearsal areas)

This classification highlights the need to support both **cultural experience and production ecosystems**. Similarly, the New South Wales Cultural Infrastructure Plan adopts a **policy-driven and investment-oriented approach**, linking cultural infrastructure to economic growth, accessibility, and community well-being. It emphasizes affordability, inclusivity, and integration with broader urban development strategies.

5.2 Indian Case Studies

Indian planning frameworks reveal a strong emphasis on **heritage-led development and cultural integration into urban policy**.

- The Delhi Master Plan 2041 focuses on **heritage conservation, adaptive reuse, and cultural precinct development**, promoting clustering of assets and integration with tourism and public space planning.
- The Chandigarh Master Plan 2031 emphasizes **regulatory control and preservation of urban form**, demonstrating how cultural identity can be embedded within planning controls and design guidelines.
- The Ahmedabad Master Plan 2031 highlights **community-based heritage conservation**, promoting adaptive reuse, stakeholder participation, and financial instruments such as TDR and PPP models.
- The **National Mission on Cultural Mapping (NMCM)**, launched by the Ministry of Culture, Government of India, represents the country's largest initiative for documenting cultural resources. By integrating these datasets into a GIS-enabled platform, the initiative supports cultural documentation, policy formulation, and preservation of India's diverse cultural heritage.

5.3 Key Insights from Case Studies and Literature

Across contexts, three consistent themes emerge:

- **Integration with Planning Systems:** Cultural infrastructure is most effective when embedded within statutory planning frameworks
- **Balance of Conservation and Development:** Adaptive reuse and heritage integration are critical in historic cities
- **Need for Accessibility and Participation:** Infrastructure provision alone is insufficient without inclusive access and engagement.

The following Table 5-1 and show a summary of the studies done.

Table 5-1: Literature Studies Compilation

Sl.no.	Index/Study Name	What	Source	Parameters for Measurement	Inference
1	American Creative Index	Measures national economy through creative industries	Richard Florida, Martin Prosperity Institute	Technology, Talent, Tolerance; economic value from culture	Aggregates factors for economic growth; considers territory, demographics
2	European Creativity Index	Cultural dimension's contribution to economy	EUROSTAT, European Union	Education, employment, policy, social, technology, openness, diversity	Assesses creative/cultural policy impact; city ranking
3	Cultural & Creative Cities Monitor	Benchmarks city strengths for policy	European Commission	24 indicators, 9 dimensions: culture, social, economic	All the indicators to measure city creative index
4	Hong Kong Creative Index	Assesses creative vitality and system integration	Centre of Cultural Policy and Research, HKU	Manifestations of creativity, Institutional, Human, Social, Cultural capital	Parameters under the cultural capital
5	Chinese Creative City Index	Compares creative competitiveness among cities	Linked policy/academic sources	1 main index (CCCI), 4 sub-indexes (drivers, demand, support, industrial influence)	City -level cultural and creative development parameters
6	Chinese Urban Creativity Index	Compares urban culture/innovation	Prof. Zhou Zhirin, Shenzhen University	4 modules, 11 foundations, 28 third-level indicators	Provides national benchmark for creative city parameters
7	UNESCO Culture 2030	Monitors culture's role in sustainable development	UNESCO	Environment, Resilience, Livelihood, Knowledge/Skills, Inclusion	Global framework for sustainable, cultural policy measurement

Source: composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor, UNESCO 2030, Montalto, V., Moura, C. J. T., Langedijk, S., & Saisana, M. (2019).

Table 5-2: Case Studies Compilation

Sl.no.	Case Study	Primary Focus	Core Strategy	Unique Implementation Tool	Key Inferences
1	London (CIP 2019)	Economic & Creative Growth	Data-driven mapping of "Consumed" vs. "Produced" culture.	Infrastructure Toolbox: GIS mapping & protection of at-risk venues.	Distinguishing between where culture is made vs. seen ensures a balanced creative ecosystem.
2	New South Wales (CIP 2025)	Social Wellbeing & Innovation	Culture as a foundational part of daily life and economic identity.	Cross-Sectoral Partnerships: Embedding culture in all gov portfolios.	High community buy-in (98% support) correlates with seeing culture as a job creator. Kano model usage in measuring cultural impact
3	Delhi (MP 2041)	Heritage-Led Regeneration	Integrating massive heritage assets into a modern urban fabric.	Heritage TDR: Financial incentives (Floor Area Ratio) for restoration.	Adaptive reuse and "Cultural Circuits" can turn neglected heritage into economic hotspots.
4	Chandigarh (MP 2031)	Modernist Preservation	Maintaining the "Sun, Space, Verdure" philosophy of Le Corbusier.	Strict Design Review: 13 grades of asset categorization & concept approvals.	Rigid architectural control preserves city identity but limits mass redevelopment.
5	Ahmedabad (MP 2031)	Living Heritage	Conserving the density and community of the historic Walled City.	Pol House Rehabilitation: PPP models and flexible TDR for private owners.	Managing "living" heritage requires balancing modern amenities with 14,000+ historic structures.
6	National Cultural Mapping	Cultural heritage mapping	Creation of a comprehensive national inventory of artists, artisans, cultural institutions, festivals, and heritage assets to support evidence-based cultural planning and policy.	GIS-enabled digital cultural database; nationwide registration portal; artist profiling; geo-tagging of cultural assets; integration of tangible and intangible cultural resources.	Demonstrates the importance of systematic cultural data collection and mapping for planning. Highlights that intangible cultural practices and informal cultural sectors should be treated as measurable planning resources alongside physical cultural infrastructure.

Source: Greater London Authority. (2019), Harwin, D. (2025), HE, the Administrator, UT. (n.d.). (2031).

6. Methodology

This study adopts a multi-dimensional, indicator-based approach to develop a Cultural Infrastructure Planning framework tailored to the Indian urban context. The methodology integrates international best practices with locally relevant adaptations, combining quantitative techniques with qualitative inputs to construct a composite cultural index. The overall approach is structured into six key stages: indicator identification, classification, weighting, data collection, normalization, and index computation.

6.1 Indicator Identification and Contextualization

The identification of indicators for assessing cultural infrastructure forms the foundation of the proposed framework. This study draws upon established international models that have systematically operationalized culture as a measurable component of urban development. Key references include the Cultural and Creative Cities Monitor developed by the European Commission, the American Creativity Index, the European Creativity Index, the Hong Kong Creativity Index, and UNESCO's Culture 2030 Indicators framework (Staniulytė, V. (2018); Montalto et al., 2019; Eurostat, 2019; University of Hong Kong, 2014; UNESCO, 2019). These frameworks collectively provide a multi-dimensional understanding of cultural systems, incorporating aspects such as cultural participation, infrastructure provision, creative economy, governance, and social inclusion.

While these models offer comprehensive benchmarking tools, their direct application to the Indian context is limited due to structural and contextual differences. Indian cities are characterized by diverse cultural practices, significant informal cultural economies, and uneven data availability across institutional and spatial scales. As highlighted in previous studies, global indices often prioritize formal economic outputs and institutional datasets, which may not adequately capture intangible cultural practices, community-led activities, or informal cultural networks prevalent in developing countries (Montalto et al., 2019; UNESCO, 2019).

To address these limitations, the selected indicators were critically filtered and contextualized based on three primary criteria: (i) relevance to the Indian urban and planning context, (ii) availability and reliability of data at the municipal level, and (iii) measurability and comparability across cities. Indicators lacking consistent data sources, clear operational definitions, or contextual applicability were excluded from the framework. For instance, variables such as cultural exports, private sponsorships, and advanced digital innovation metrics—commonly used in global indices—were omitted due to limited data accessibility and relevance in the selected study area.

Indicators lacking consistent data sources or clear definitions within the local context were excluded. The final set of indicators reflects both global benchmarking standards and ground-level realities, ensuring contextual applicability.

6.2 Classification of Indicators into Domains

The selected indicators were grouped into six primary domains based on their functional similarities and conceptual alignment with existing literature:

- **Human Capital** (e.g., arts education, cultural workforce)
- **Cultural Participation** (e.g., attendance, public perception)
- **Cultural Infrastructure** (e.g., number and typology of venues, accessibility)
- **Creative Industries and Economy** (e.g., economic contribution of cultural sectors)
- **Institutional Framework** (e.g., policies, zoning regulations)
- **Social and Spatial Dynamics** (e.g., inclusivity, use of public spaces)

This classification enables a structured evaluation of cultural systems, capturing both “hard” infrastructure (physical assets) and “soft” dimensions (participation, perception, and social dynamics). It also facilitates domain-wise comparison and targeted policy insights.

6.3 Weighting of Indicators using Analytic Hierarchy Process (AHP)

To ensure that each indicator contributes proportionately to the overall assessment, weights were assigned using the Analytic Hierarchy Process (AHP). AHP is a multi-criteria decision-making method that enables systematic comparison of variables through pairwise evaluation.

The process involves:

- Structuring indicators into hierarchical levels (goal → domains → indicators)
- Conducting pairwise comparisons to determine relative importance
- Deriving normalized weights for each indicator and domain
- Ensuring consistency of judgments through consistency ratio checks

This method allows the integration of expert judgment with quantitative analysis, ensuring that more influential dimensions—such as participation or accessibility—are appropriately emphasized in the final index. The weighting of indicators and domains was carried out using the **Analytic Hierarchy Process (AHP)**, based on structured inputs from a multidisciplinary expert panel.

The expert panel comprised of:

- Urban planners and academicians in planning and architecture – 6 nos.
- Cultural practitioners (artists, performers, organizers) -4 nos.
- Institutional stakeholders (venue managers, cultural administrators) -8 nos.

This composition ensured representation of both **technical expertise and ground-level cultural experience**, enabling a balanced evaluation of indicator importance using Saaty’s 7-point scale. The details of the pairwise comparison matrix can be found in Annexure 1. The consistency ratio for all pairwise comparison matrices was maintained below the acceptable threshold of **0.1**, ensuring logical coherence and reliability of expert judgments. The Consistency Index (CI) was calculated using:

$$CI = (\lambda_{\max} - n) / (n - 1)$$

where:

- $\lambda_{\max}$ = principal eigenvalue of the comparison matrix
- n = number of criteria

The Consistency Ratio (CR) was subsequently computed as:

$$CR = CI / RI$$

where:

- CI = Consistency Index
- RI = Random Index corresponding to matrix size

According to Saaty (1980), a consistency ratio below 0.10 indicates acceptable consistency.

• Consistency Results

The pairwise comparison matrices used in this study satisfied the accepted consistency threshold as shown in Table 6-1.

Table 6-1: Domain level and Consistency Ratio

Hierarchical Level	Consistency Ratio (CR)
Human Capital Indicators	0.06
Cultural Participation Indicators	0.07
Cultural Infrastructure Indicators	0.05

Creative Economy Indicators	0.08
Institutional Framework Indicators	0.04
Social & Spatial Dynamics Indicators	0.07

All CR values were below the recommended threshold of 0.10, indicating acceptable consistency in expert judgments and validating the resulting weights. Detailed AHP calculations, including representative pairwise comparison matrices, normalized matrices, eigenvectors, and consistency ratios, are provided in Appendix 1 to enhance methodological transparency and reproducibility.

6.4 Data Collection

Data for the selected indicators were collected through a combination of **secondary sources** and **primary surveys**, ensuring both quantitative robustness and user-centric insights. Primary data collection was conducted through three categories of surveys: household surveys, cultural practitioner surveys, and expert surveys (venue managers/institution heads). The sampling approach was structured to ensure representation across all four municipal corporations. The sample size for the primary household survey was determined using **Cochran's formula**, which is widely applied for estimating sample sizes in large populations where variability is unknown. Samples could be distributed proportionally across administrative boroughs of each Corporation. Using Cochran's Formula, and assuming a 95% accuracy, the total sample size for all the 4 municipal corporations is 384. Out of the 384 samples, due to time restrictions and limitations of the study, a total of 352 household surveys were collected, of which 188 could be retained after data cleaning, giving an overall response rate of 49 %. Responses were excluded due to incomplete questionnaires, duplicate submissions, inconsistent response patterns, or substantial missing information. Although the achieved sample was lower than the calculated Cochran estimate, it remained adequate for the exploratory objectives of the study, where survey responses primarily informed indicator validation rather than statistical population estimation. Potential non-response bias was assessed by comparing early and late respondents across key demographic characteristics, including age, gender, educational attainment, and municipality of residence. No substantial differences were observed, suggesting that non-response bias is unlikely to have materially influenced the study findings. Apart from the household surveys, a survey of 50 cultural practitioners and all the venue managers and institution heads was conducted. The sampling strategy used was snowballing based on the sample size needed in each borough level. To assess nonresponse bias, demographic distributions of retained responses were compared across age, gender, and occupation categories. No major skewness was observed across municipal samples, indicating acceptable representativeness for exploratory comparative analysis.

6.4.1 Primary surveys

A summary of the surveys done and their purpose, along with the sample sizes, is shown in Table 6-2.

Table 6-2 :Types of survey and sample size

Sl. No.	Survey Type	Purpose	Study Area	Sample Size
1	Household Survey	To understand user behavior, cultural	Kolkata Municipal Corporation (KMC)	75

Sl. No.	Survey Type	Purpose	Study Area	Sample Size
		participation patterns, and the perceived socio-cultural impact of cultural infrastructure	Howrah Municipal Corporation (HMC)	45
			Bidhannagar Municipal Corporation (BMC)	38
			Chandannagar Municipal Corporation (CMC)	30
			Total	188
2	Cultural Practitioners Survey	To assess the interaction of artists and creative professionals with cultural infrastructure (accessibility, usability, challenges)	Practitioners across all four municipal corporations	50
3	Expert Survey (Venue Managers / Institution Heads)	To understand operational aspects such as capacity, usage patterns, and management challenges of cultural venues	KMC	75
			HMC	17
			BMC	19
			CMC	8
			Total	119

Source: Author

6.4.2 Secondary Data Sources

Secondary data sources were collected from the following:

1. Census of India (2011) for demographic and socio-economic indicators
2. Municipal and development authority records for cultural infrastructure inventory
3. Official datasets on institutions, transport networks, and land use

These datasets supported spatial mapping, indicator computation, and inter-city comparison.

6.4.3 Survey Instrument

Primary data were collected through three structured questionnaires administered to households, cultural practitioners, and venue managers across the four municipal corporations of the Kolkata Metropolitan Area. Separate survey instruments were developed for each respondent group to capture complementary dimensions of cultural infrastructure and participation. The questionnaires were designed following a review of international cultural indicator frameworks, including the American Creativity Index (Florida, 2017), the Cultural and Creative Cities Monitor (Montalto et al., 2019), the Hong Kong Creativity Index (Centre for Cultural Policy Research, 2005), and UNESCO's Culture 2030 Indicators (UNESCO, 2019). The instruments were refined through expert consultation with urban planners, academics, and cultural practitioners to ensure content validity and contextual relevance to the Indian metropolitan setting.

The household questionnaire comprised four sections. The first section collected demographic information, including age, gender, and place of residence. The second examined patterns of cultural participation, including the frequency of visits to museums, libraries, theatres, cultural festivals, and community events. The third assessed perceptions of accessibility, adequacy, affordability, and quality of cultural infrastructure using five-point Likert-scale statements ranging from "strongly disagree" to "strongly agree." The final section evaluated residents' opinions regarding cultural identity, neighbourhood attachment, and the perceived role of cultural infrastructure in improving quality of life. The cultural practitioner questionnaire focused on understanding how the creative ecosystem functions. Questions addressed employment characteristics, availability of cultural spaces, financial and institutional support, collaboration networks, barriers to cultural production, and perceptions of existing cultural infrastructure. Respondents included artists, performers, musicians, designers, theatre practitioners, and representatives of cultural organizations. The venue manager/expert questionnaire collected information on the physical and operational characteristics of cultural facilities, including seating capacity, accessibility, annual visitor numbers, programming frequency, maintenance condition, funding sources, adaptive reuse of heritage buildings, and future infrastructure requirements. These responses were subsequently used to evaluate infrastructure adequacy and to inform the weighting of infrastructure-related indicators. The borough-wise survey division for all 4 municipal corporations is shown in Table 6-3.

Table 6-3: Survey size borough-wise

KMC Borough	Wards Included	Households (2011)	Proportion (%)	Sample (Households) that could be used as final data
I	1–9	80,713	7.87%	6
II	10–20	69,679	6.80%	5
III	13, 14, 29–35	92,241	9.00%	7
IV	21–28, 38, 39	75,540	7.37%	6
V	36, 37, 40–50	56,192	5.48%	4
VI	46, 47, 51–62	57,015	5.56%	4
VII	56–67	64,528	6.30%	5
VIII	68–90 (Partial)	70,553	6.88%	5
IX	71, 73–82	68,073	6.64%	5
X	81, 89, 91–100	73,810	7.20%	5
XI	103, 104, 110–114	55,249	5.39%	4
XII	101, 102, 105–109	60,118	5.87%	4
XIII	115–120, 122	54,490	5.32%	4
XIV	121, 127–132	47,839	4.67%	3

XV	133–141	46,550	4.54%	3
XVI	123–126, 142–144	51,738	5.05%	5
HMC Borough	Wards Included	Households (2011)	Proportion (%)	Sample (Households) that could be used as final data
I	1–8	171,900	15.96%	8
II	9–16	179,200	16.64%	7
III	17–24	162,100	15.05%	6
IV	25–33	195,500	18.15%	10
V	34–42	190,800	17.71%	8
VI	43–50	177,500	16.48%	6
BMC Borough	Wards Included	Households (2011)	Proportion (%)	Sample (Households) that could be used as final data
I	1-7	30,280	20.0%	7
II	8-14	33,570	15.0%	6
III	15-21	29,950	18.0%	7
IV	22-28	36,680	13.0%	5
V	29-35	38,410	16.0%	6
VI	36-41	38,560	18.0%	7
CMC Borough	Wards Included	Households (2011)	Proportion (%)	Sample (Households) that could be used as final data
I	1-3	14,520	32.5 %	10
II	4-8	16,950	37.9 %	11
III	8-11	13,220	29.6 %	9

Source: Author

Prior to full-scale administration, the questionnaires were pilot tested with a small group of respondents representing each stakeholder category to assess clarity, relevance, and comprehensibility. Feedback from the pilot survey was incorporated by refining question wording and improving the sequencing of sections. Completed questionnaires were subsequently screened for completeness, duplicate entries, and logical consistency before inclusion in the analysis.

6.5 Data Normalization

Given that indicators are measured in diverse units (e.g., percentages, counts, financial values), direct aggregation is not feasible. To ensure comparability, all indicators were normalized to a common scale.

Normalization was carried out using statistical techniques (min-max scaling), transforming all values into a standardized range (0–1). This prevents any single indicator with a larger numerical magnitude from disproportionately influencing the final index. To ensure comparability across indicators measured in different units and scales, all variables were normalized using the **min–max normalization method**.

The normalized value for each indicator was computed as:

$$X' = (X - X_{\min}) / (X_{\max} - X_{\min})$$

where X represents the original value, and $X_{\min}$ and $X_{\max}$ denote the minimum and maximum values of the indicator across all cities.

Min–max normalization was preferred over z-score standardization due to the small sample size ($n = 4$ cities), where distribution-based methods may produce unstable results. Additionally, this method ensures interpretability, as higher normalized values directly correspond to better performance. For indicators where lower values indicate better performance (e.g., distance to cultural facilities), reverse normalization was applied. Outliers were retained where they reflected actual disparities in infrastructure or participation, rather than being treated as statistical anomalies. This approach preserves the analytical integrity of spatial and socio-economic differences across cities.

6.6 Index Formulation and Computation

The Cultural Infrastructure Index is computed in a two-stage aggregation process:

- **(a) Domain-Level Index**

For each domain, individual indicators are aggregated using their respective weights:

- Domain Index represents performance within a specific dimension (e.g., participation, infrastructure)
- Allows identification of strengths and gaps within each domain

- **(b) Composite Cultural Index**

The overall cultural score for each city is computed by aggregating domain indices using domain-level weights derived from AHP:

- Provides a comparative ranking across cities
- Enables cross-domain evaluation and benchmarking

All indicators are scaled within a uniform range to ensure balanced contribution and avoid distortion in the final score.

7 . Formulation of cultural index

The development of a cultural index is a central part of the study and is also one of the objectives of the thesis. It is also intended to serve as a standardised metric for evaluating and comparing the performance of the cultural infrastructure across the four municipal corporations in the KMA region. This index will also be used to rank these corporations in order of their performance.

7.1 Assessment indicators for cultural infrastructure

Drawing from international literature and adapting to the Indian context, this study draws key indicator categories for assessing cultural infrastructure: Human Capital, Cultural Participation, Creative Industries & Economy, Cultural Infrastructure, Institutional Framework, and Social & Spatial Dynamics. Each domain is represented by measurable, contextually relevant indicators, with special attention to data availability and relevance for West Bengal's urban context.

In the following Table 7-1 the indicators are detailed with the domains, detailed indicators, the source, the Indian context for finding the data, limitations, and the type of data (primary/secondary).

Table 7-1: Domain and indicators derived from literature study

Domain	Indicator (Detailed)	Source Index	Indian Context: Possible Data Source- what and where to collect	limitations	Availability	Type
Human Capital	% of graduates from arts/humanities	European Index	Document all universities and colleges providing arts degrees in the concerned areas (from AISHE Report)	Find out the universities from the whole list which fall under the selected MCs	Moderate	secondary
			From each university website, find out the total number of graduates last year			
			Find out the total percentage of graduates in all streams under that MC			
	No. of art/music/dance schools	CCCM / HKCI	No. of institutes from examination boards registered in Pracheen Kala Kendra and Bangiya Sangeet Parishad	City-wise division not available	Easy	primary
	Cultural employment %	European, US Index	Number of organizations employing artistes under the state and central government	Actual employment % difficult to find	Moderate	secondary

	No. of Artist training grants/fellowships	HKCI	Ministry of Culture, Sangeet Natak Akademi, state culture directorate	State-level information available	Available	secondary
Cultural Participation	Attendance at cultural venues per year	CCCM, HKCI	venue- where audience visits, list them and ask their offices about number of bookings per year	-	primary survey	primary
	Income from movie theatres	-	district statistical handbooks	-		secondary
	Public opinion on art value	HKCI	Primary survey needed	-	Primary survey based	primary
	Artist's opinion on value of cultural venues	NSW CIP	Primary survey needed	-	Primary survey based	primary
Cultural Infrastructure	No. of museums, libraries, galleries, theatres	London CIP, CCCM	Department of Information and Culture - culture and film directories, other directory sources like Justdial, etc.	Private spaces to be taken as additional variables	Easy	secondary
	No. of Adaptive reuse of heritage into cultural venues	London CIP / Delhi MPD 2041	Kolkata heritage commission report		Moderate	secondary
	Accessibility to culture (walkability, transport)	Paris 15-min City, CCCM	mapping all the documented institutes and finding out no of public transport nodes, parking availability within a 2 km radius - accessibility index		Doable	primary
Creative Industries & Economy	% amusement tax from creative sectors	US Index, Chinese Index	state budget, budget of the individual municipal corporations	the state GDP does not mention culture or heritage, so amusement tax used as proxy	Primary survey of experts needed	primary
Institutional Framework	Cultural policy presence (city/state)	CCCM	Dept. of Culture and Information (WB)		Easy	secondary
	Zoning laws supporting culture	London, Paris	recent master plans/local area plans	not done recently	Moderate	secondary

Social & Spatial Dynamics	% Representation of women/minorities in arts	HKCI	artist list from ICCR, EZCC, DD BANGLA and AIR	the unregistered artists are not taken into consideration	moderate if info is available from the office	p+s
			segregate the number of artists according to the study areas			
			number of women in them and its %			
	Civic & religious spaces used for culture	HKCI	data collected from Pickle factory dance lab		Possible	primary

Source: Author

Table 7-2 shows the indicators that have been omitted due to lack of data or relevance, thus serving as limitations.

Table 7-2: Comparative assessment indicators from different studies excluded

Domain	Indicator	Source Index	Reason for omitting
Cultural Participation	Participation in workshops/festivals	HKCI	Availability of data, no definition of what kind of workshops/festivals
Creative Industries & Economy	Cultural startup ecosystem	CCCM	Startup ecosystem is not contextual
	Cultural exports (art and craft, films, etc.)	Chinese Index	Not contextual
	Sponsorships & private investment in arts	HKCI	Private data not available
Institutional Framework	Govt. investment per capita in arts	HKCI	Data not available
	Existence of cultural infrastructure plan	London CIP	Not contextual- does not exist
Social & Spatial Dynamics	Intercultural exchange or festivals	CCCM	Data not available- no proper description of how to measure
	Community-led cultural initiatives	CCCM	Not needed in a CIP as only focusing on govt. identified ones
Technology & Innovation	Use of digital tools in culture	Eurostat, Chinese Index	data not available

Source: Author

7.2 Defining The Indicators

The following indicators are defined across the domains of cultural infrastructure, creative industries & economy, institutional framework, social and spatial dynamics, human capital,

and cultural participation. Each indicator is contextualized for use in the Indian urban/cultural environment, following both international standards and localized data adaptation.

7.2.1 Human capital

7.2.1.1 % of Graduates from Arts/Humanities

Definition: The percentage of students graduating from formally recognized arts and humanities programs out of total graduates for a given time.

Context: Sourced from education ministry statistics, including university and college records.

Limitation: Data may be unavailable at granular levels; private institutes not always covered.

7.2.1.2 No. of Art/Music/Dance Schools

Definition: The number of registered schools or training institutes offering formal education in visual arts, music, or dance.

Context: Based on government/cultural directory listings and local surveys.

Limitation: May exclude informal or non-registered entities.

7.2.1.3 Count of Artistic Employments

Definition: The total count of people employed in cultural or creative occupations (artists, curators, musicians, performers, designers, heritage workers), regardless of industry.

Context: Employment census and labour market surveys, categorized according to NACE/ISCO job codes.

Limitation: Freelance and gig workers may be underrepresented in official data.

7.2.2 Cultural Participation

7.2.2.1 Allowances for Cultural Venues per Capita

Definition: Average public or private spending/allowances for cultural venues, divided by the population, in a given area and year.

Context: Government budgets, grants, sponsorship reports, ticket sales data.

Limitation: Private spending is difficult to track and may be estimated.

7.2.2.2 Public Opinion on Arts Value

Definition: The percentage of surveyed respondents expressing positive attitudes and perceived value towards arts and culture, as measured by dedicated questionnaires.

Context: Municipal cultural surveys, national attitude studies.

Limitation: Subjective measure, susceptible to survey design and sample bias.

7.2.2.3 Artists' Opinion on the Value of Cultural Work

Definition: The percentage of professional and amateur artists reporting good social and economic returns, recognition, or fulfilment from cultural work, based on questionnaire surveys.

Context: Primary survey-based, typically annual or biennial assessments.

Limitation: Sample size and response bias may affect results.

7.2.3 Cultural infrastructure

7.2.3.1 No. of Museums, Libraries, Galleries, Theatres

Definition: The total count of distinct cultural venues, including museums, public libraries, galleries, and theatres, within a specified municipal area.

Context: Institutions recognized by the Department of Information and affiliated government agencies; includes public, private, and semi-private spaces.

Limitation: Data on private venues may be incomplete; spatial data accuracy varies.

7.2.3.2 Total Adaptive Reuse of Heritage into Cultural Venues

Definition: The proportion or number of existing heritage buildings repurposed for active cultural use, such as galleries, museums, or performance spaces.

Context: Derived from heritage conservation reports and local registry; includes temporary art spaces and ongoing cultural programming.

Limitation: May not account for informal or unregistered adaptations.

7.2.3.3 Accessibility to Cultural Venues (Walkability, Transport)

Definition: The percentage of the population with access to cultural venues by walking, public transport, or cycling within a reasonable distance (usually 1–2 km).

Context: GIS mapping and community transport reports are used to measure spatial reach and infrastructural equity.

Limitation: Infrastructure coverage may not reflect quality of access; subjective measure for "reasonable distance".

7.2.4 Creative industries economy

7.2.4.1 Amusement Tax from Creative Sectors

Definition: The total economic output generated from creative industries, including media, publishing, design, fashion, and film, within the urban context in terms of tax.

Context: International creativity indices frequently employ cultural GDP or gross value added as indicators of creative economy performance. However, city-level GDP disaggregated by cultural sector is unavailable for Indian municipalities. Consequently, amusement tax revenue was adopted as a proxy indicator because it reflects expenditure associated with formal cultural and entertainment activities such as cinemas and licensed entertainment venues. Although this measure does not capture the informal cultural economy, it provides a consistent and publicly available dataset across all four municipal corporations.

Limitation: Informal economy contributions might be undercounted. City-level data on GDP not available.

7.2.5 Institutional Framework

7.2.5.1 Cultural Policy Presence

Definition: The existence and effectiveness of government or civic policies directly promoting the cultural sector, measured by the number and scope of implemented policies or acts.

Context: Documentation from the Ministry of Culture, local government acts, and published mandates.

Limitation: Does not quantify implementation fidelity or impact.

7.2.5.2 Zoning Laws Supporting Culture:

Definition: It includes zoning regulations with respect to cultural infrastructure and culturally functioning spaces

Context: Documentation from the Ministry of Culture, local government acts, and published mandates.

Limitation: Does not exist in the study area.

7.2.6 Social & Spatial Dynamics

7.2.6.1 % Representation of Women/Minorities in the Arts

Definition: The proportion of active participants and recognized leaders from women and minority groups in cultural activities and arts organizations.

Context: Surveyed and reported annually by government arts bodies and cultural NGOs.

Limitation: Self-reporting bias and data gaps for smaller organizations.

7.3 Formulating the Index – Computing the Score

The process for deriving the scores for cultural infrastructure involves a multi-step framework that ensures each parameter and indicator is carefully contextualized, classified, assessed, and incorporated into an aggregate performance score. The steps are as follows:

- i. **Contextualize Parameters:** Identify and shortlist relevant parameters for evaluation, ensuring a clear rationale and scope for inclusion.
- ii. **Classify Framework and Indicators:** Categorize each framework into relevant domains and classify indicators according to their function and impact area.
- iii. **AHP-based Weightage Distribution:** Apply Analytical Hierarchy Process (AHP) to distribute weights to various parameters, based on expert input and contextual relevance.
- iv. **Parameter Documentation:** Collect and document data for each parameter through surveys, secondary data, and participatory methods.
- v. **Parameter Normalization:** Normalize each parameter using suitable mathematical tools (max-min normalization) to facilitate comparability.
- vi. **City Cultural Score Calculation:** Calculate the score for each municipal corporation by aggregating the normalized and weighted parameter scores and summing them for an overall value.
- vii. **Correlation and Validation:** Perform correlation checks to verify relationships between parameters and refine final scores for accuracy and reliability.

7.3.1 Scoring index

The methodology incorporates an indexing approach to evaluate the performance of individual domains and the overall cultural infrastructure quality. The indices are structured as follows:

i. Domain-Level Index

For each domain, an index (I_j) is calculated to show relative performances and indicator scope for improvement:

$$I_j = \sum_{k=1}^{n_j} I_{jk} \cdot w_k$$

Where:

I_j = Domain Index

I_{jk} = Value of indicator k in domain j

w_k = Normalized weight of indicator k, obtained from AHP

n_j = Number of indicators in domain j

ii. Composite Cultural Index

To assess and rank municipal corporations across all domains, the following aggregation is performed to achieve an overall index (I):

$$I = \sum_{j=1}^m I_j \cdot W_j$$

Where:

I = Overall Index

I_j = Domain index as previously calculated

W_j = Normalized weight for each domain from AHP

m = Number of domains

These index structures support rigorous, transparent, and comparable analysis of cultural infrastructure so that municipal corporations can be ranked, and targeted interventions can be planned for domains with greater improvement needs.

7.3.2 Cultural score and comparative assessment

The score is computed using the methodology, and the table 4 shows the scores calculated for each indicator in each corporation, then the overall domain score of each corporation, and then the total score for each corporation.

At the first stage, individual indicators within each domain are normalized to a common scale (0–1) to ensure comparability across diverse units of measurement. These normalized indicators are then aggregated using weights derived from the Analytic Hierarchy Process (AHP) through expert opinions, resulting in domain-specific indices. Each domain index represents the relative performance of a city within a particular dimension, such as cultural participation, infrastructure provision, or human capital.

At the second stage, the overall cultural score for each city is calculated by aggregating the domain indices using domain-level weights. This produces a composite index that enables comparative evaluation and ranking of cities within the study area. The methodology ensures that both quantitative measures (e.g., number of cultural venues, economic indicators) and qualitative dimensions (e.g., user perception, participation levels) are incorporated into a unified framework. Table 7-3 shows the weightages given to each domain as derived from the expert opinions. The scoring system is organized into 6 main domains, each representing a critical dimension of cultural infrastructure:

Table 7-3: Domain and weightage as per AHP

Sl.	Domain	Weight
1	Human Capital	0.20
2	Cultural Participation	0.25
3	Cultural Infrastructure	0.20
4	Creative Economy & industries	0.15
5	Institutional Framework	0.1
6	Social and spatial dynamics	0.1

Source: Author

Now, the final computation of the indexes is done for each municipal corporation. Based on the weightages of each sub domain and the expert weightages derived using AHP for the individual indicators under the sub domains, the final score for each corporation is computed as described in detail in Table 7-4.

Table 7-4: Cultural score of city corporations

Main domain weightages (W_j)	Main domain	Sub domain	Weightage from AHP (w_k)	Scores (i_{jk})				REMARKS
				KMC	HMC	BMC	CMC	
0.2	Human Capital	% of graduates from arts/humanities	0.25	0.344	0.131	0.197	0.497	
		No. Of art/music/dance schools	0.08	0.177	0.330	0.110	0.220	
		Organizations Employing in Cultural Sector	0.67	0.002	0.006	0.024	0.012	No of organizations per 1000 people
		Domain Scores		0.102	0.063	0.074	0.149	
		Normalized Domain Scores (I_j)		0.444	0	0.120	1	
0.25	Cultural Participation	Attendance at cultural venues per year	0.35	0.333	0.330	0.473	0.599	Based on bookings/year per 1000 people
		Income from movie theatres	0.248	0.008	0.017	0.011	0.015	Income/population*1000
		Public opinion on art value	0.24	0.91	0.83	0.87	0.99	Percent of respondents who think these cultural venues make a

Main domain weightages (W_j)	Main domain	Sub domain	Weightage from AHP (w_k)	Scores (i_{jk})				REMARKS
				KMC	HMC	BMC	CMC	
								positive difference in their life from Household Survey
		Artists' opinion on value of cultural venues	0.162	0.96	0.94	0.97	0.95	Percent of positive respondents from Cultural Practitioners Survey
		Domain Scores		0.492	0.471	0.534	0.605	
		Normalized Domain Scores (I_j)		0.158	0	0.470	1	
0.2	Cultural Infrastructure	No. Of museums, libraries, galleries, theatres	0.584	0.017	0.016	0.033	0.065	Number per 1000 population
		No. Of Adaptive reuse of heritage into cultural venues	0.144	0.009	0.025	0	0.08	% with respect to total heritage structures
		Accessibility to culture (walkability, transport)	0.27	0.82	0.86	0.71	0.6	Based on distance from public transit nodes
		Domain Scores		0.232	0.245	0.212	0.220	
		Normalized Domain Scores (I_j)		0.619	1	0	0.238	
0.15	Creative Industries & Economy	Amusement tax paid by the institutions	1	0.069	0.031	0.072	0.046	Aggregate of all venues considering a single event per capita
		Domain Scores		0.0694	0.031	0.072	0.046	
		Normalized Domain Scores (I_j)		1	0	.0948	0.395	
0.1	Institutional Framework	Zoning laws supporting culture	1	0	0	0	0.000	
		Cultural Policy presence	1	0	0	0	0.000	
		Domain Scores		0	0	0	0.000	
		Normalized Domain Scores (I_j)		0	0	0	0.000	

Main domain weightages (W _j)	Main domain	Sub domain	Weightage from AHP (w _k)	Scores (i _{jk})				REMARKS
				KMC	HMC	BMC	CMC	
0.1	Social & Spatial Dynamics	% Representation of women/minorities in arts	0.666	0.56	0.49	0.55	0.53	Only based on ICCR and EZCC empaneled list
		Civic & public spaces used for culture	0.334	0.0222	0	0.0047	0	Numbers per 10000 population
		Domain Scores		0.38	0.33	0.37	0.35	
		Normalized Domain Scores (I _j)		1	0	0.7686	0.4929	
	Total weighted score (I)			0.503	0.2	0.382	0.606	

Source: Author

The computed cultural scores in Table 7-4 indicate distinct typologies of urban cultural systems:

- Kolkata emerges as an **economy-led system**, with strong infrastructure and economic indicators but relatively lower participation
- Howrah reflects an **infrastructure-isolated condition**, where physical assets exist without corresponding human capital or engagement
- Bidhannagar demonstrates a **balanced model**, with relatively strong linkage between participation and creative economy
- Chandannagar functions as a **people-centric system**, where participation remains high despite limited infrastructure

Among the cities, Chandannagar (CMC) records the highest overall cultural score, followed by Kolkata (KMC) and Bidhannagar (BMC), while Howrah (HMC) ranks the lowest. This variation highlights the complex interplay between physical infrastructure, human capital, and community engagement in shaping cultural ecosystems. The following Table 7-5 summarizes the cultural scores calculated for each of the four corporations and how they vary based on the domains of the cultural score, which is discussed later.

Table 7-5: Summary of cultural scores of city corporations

DOMAIN	Scores			
	KMC	HMC	BMC	CMC
Human Capital	0.4448	0	0.1209	1
Cultural Participation	0.1589	0	0.4705	1
Cultural Infrastructure	0.6197	1	0	0.2385
Creative Industries & Economy	0.9134	0	1	0.3613

Social & Spatial Dynamics	1	0	0.7686	0.4929
Total Domain Scores	0.503	0.2	0.3829	0.606

Source: author

These zero values indicate:

- **Absence or near-absence of formal measurable indicators** (e.g., lack of documented cultural workforce, limited institutional data)
- **Weak integration of cultural systems within formal governance structures**
- **Limited participation captured through survey-based indicators**

Importantly, these scores do **not imply the absence of cultural life**, but rather reflect the **lack of formalized, measurable, or institutionally recorded cultural activity**. Several domain scores assume a value of zero following min–max normalization. Although several institutional dimensions were initially identified, comparable municipal-level data were only consistently available for zoning and statutory planning provisions. Consequently, other institutional indicators received missing values rather than being artificially estimated, explaining the relatively low institutional scores. These values should not be interpreted as indicating the complete absence of cultural infrastructure or activity. Rather, they represent the lowest observed value among the four municipalities for a given indicator after normalization. Consequently, a zero score reflects comparatively lower measurable performance within the study sample rather than an absolute lack of cultural assets. Since normalization was performed across only four municipalities, relatively small differences in raw values occasionally produced large normalized contrasts. Therefore, domain scores should be interpreted comparatively rather than absolutely.

A domain-wise analysis reveals distinct performance patterns:

- **Human Capital:** Chandannagar demonstrates the strongest performance, indicating a high concentration of culturally engaged individuals and active participation in artistic practices. In contrast, Howrah records significantly lower values, suggesting a limited presence of cultural workforce and training ecosystems.
- **Cultural Participation:** Chandannagar again emerges as a leader, reflecting strong community engagement and high perceived value of cultural activities. Kolkata, despite having extensive infrastructure, shows comparatively lower participation levels, indicating a disconnect between availability and usage.
- **Cultural Infrastructure:** Howrah records the highest normalized score in this domain, primarily due to accessibility advantages and spatial distribution of facilities. However, this does not translate into higher participation, suggesting inefficiencies in utilization.
- **Creative Industries and Economy:** Kolkata and Bidhannagar perform relatively well, reflecting stronger economic linkages and revenue generation from cultural activities. This indicates the presence of more formalized cultural economies in these cities.
- **Social and Spatial Dynamics:** Kolkata and Bidhannagar exhibit relatively balanced performance, while Chandannagar maintains moderate scores, indicating the role of community-led cultural engagement even in the absence of strong institutional or economic backing.

7.4 Typological Interpretation of City-Level Cultural Systems

To move beyond numerical comparison, the results were further interpreted to identify distinct **cultural development typologies** across the four municipal corporations. These typologies reflect the structural relationship between infrastructure, participation, economy, and human capital, offering deeper insight into how cultural systems function within different urban contexts.

7.4.1 Kolkata (KMC) — Economy-Led Cultural System

Kolkata exhibits a strong performance in terms of cultural infrastructure and economic indicators, reflecting its historical position as the cultural and institutional core of the region. The presence of established venues, formal cultural institutions, and revenue-generating activities indicates a well-developed cultural economy. However, this strength is contrasted by relatively low levels of cultural participation.

This divergence suggests that the availability of infrastructure and economic resources has not translated into widespread public engagement. One possible explanation lies in the institutionalization and formalization of cultural spaces, which may limit accessibility for broader sections of society. Additionally, spatial concentration of cultural infrastructure within select urban cores reduces equitable access across the city.

This pattern highlights a critical planning challenge: cultural infrastructure, when treated primarily as an economic or institutional asset, risks becoming exclusionary rather than participatory. The findings suggest the need for policies that activate existing spaces through programming, outreach, and inclusive design, rather than focusing solely on expansion.

7.4.2 Howrah (HMC) — Infrastructure-Isolated System

Howrah presents a contrasting condition, where relatively high infrastructure scores coexist with extremely low human capital and participation levels. Despite the presence of cultural facilities and reasonable accessibility, these spaces remain underutilized. This indicates a disconnect between physical provision and social activation, where infrastructure exists in isolation from the communities it is intended to serve. The absence of a strong cultural workforce, limited institutional support, and lack of engagement mechanisms contribute to this condition.

The case of Howrah reinforces the argument that cultural infrastructure cannot function effectively without parallel investment in “soft” components, such as skill development, cultural education, and community engagement. It also suggests that infrastructure planning, when not integrated with social and institutional strategies, may lead to inefficient utilization of resources.

7.4.3 Bidhannagar (BMC) — Balanced Modern Cultural System

Bidhannagar demonstrates a relatively balanced performance across multiple domains, particularly in creative industries and social-spatial dynamics. The moderate level of cultural participation, combined with strong economic indicators, suggests a functional relationship between cultural production and consumption. As a planned urban area, Bidhannagar benefits from relatively organized spatial distribution and emerging institutional frameworks, which support both cultural activities and economic growth. The presence of creative industries indicates a shift toward **contemporary and formalized cultural economies**, including media, design, and digital sectors.

This typology reflects a **transitional model**, where cultural infrastructure, economy, and participation are moderately aligned. It represents the most stable configuration among the

four cities, suggesting that **balanced integration of economic and social dimensions can produce sustainable cultural ecosystems**.

7.4.4 Chandannagar (CMC) — People-Centric Cultural System

Chandannagar emerges as the most distinctive case, characterized by exceptionally high scores in human capital and cultural participation despite relatively low levels of infrastructure and economic investment. This indicates a **community-driven cultural ecosystem**, where engagement is sustained through social networks, local traditions, and collective practices rather than formal institutions. The findings suggest that cultural vibrancy in Chandannagar is rooted in **intangible cultural assets**, such as festivals, local artistic traditions, and strong community participation. These elements compensate for the lack of formal infrastructure, demonstrating that cultural systems can thrive independently of large-scale investment.

This typology challenges conventional planning assumptions by showing that **participation and human capital can be more critical than infrastructure in sustaining cultural life**. It also underscores the importance of recognizing and integrating informal cultural practices within planning frameworks.

8. Spatial Analysis and Accessibility

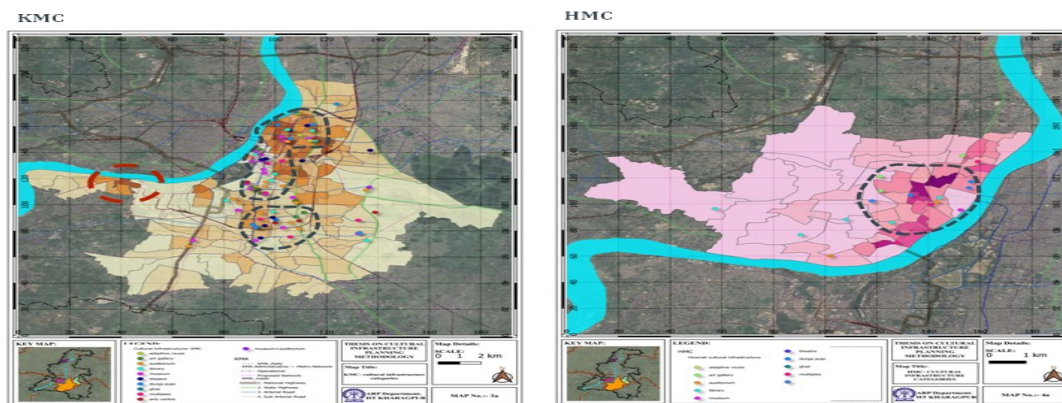


Figure 8-1: Spatial location of cultural Infrastructure, KMC and HMC
source(author)

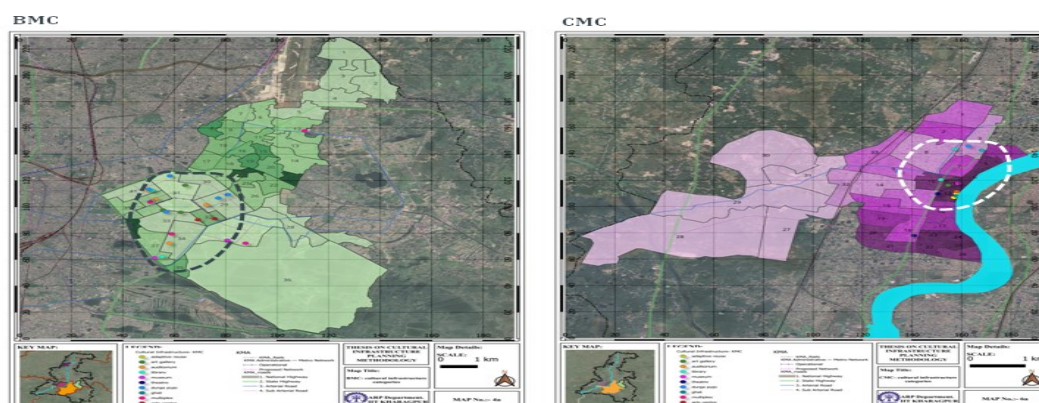


Figure 8-2: Spatial location of cultural Infrastructure, BMC and CMC
source(author)

Spatial analysis is conducted to assess the distribution and accessibility of cultural infrastructure across the study area. Accessibility is measured using proximity to public transport nodes, with influence zones defined at multiple thresholds (1 km and 2 km) as shown in **Error! Reference source not found.** and

Figure 8-1: Spatial location of cultural Infrastructure, KMC and HMC

source(author)

. In **Kolkata Municipal Corporation (KMC)**, cultural infrastructure exhibits a **high degree of spatial concentration**, particularly within the central and northern parts of the city. These areas correspond to historically significant neighborhoods and established cultural precincts, where theatres, auditoriums, museums, and performance spaces are densely clustered. Reinforcing the role of Kolkata as the primary cultural hub within the metropolitan region. However, peripheral areas show relatively lower densities of cultural infrastructure, indicating internal spatial disparities. In **Howrah Municipal Corporation (HMC)**, the distribution is comparatively **sparse and fragmented**. Cultural infrastructure is limited in number and appears scattered across the urban fabric, with minor clustering observed near older settlement areas and along key transport routes. The absence of a clearly defined cultural core suggests a lack of structured cultural development, with infrastructure not forming a cohesive network. In **Bidhannagar Municipal Corporation (BMC)**, the pattern reflects a **planned but dispersed distribution**. Cultural infrastructure is moderately distributed across sectors, often associated with institutional zones, community centers, and planned open spaces. Unlike Kolkata, the clustering is less intense, and the distribution appears more evenly spread, consistent with the planned nature of the city. However, the overall density remains lower, and the infrastructure is not concentrated enough to create strong cultural nodes.

In **Chandannagar Municipal Corporation (CMC)**, cultural infrastructure is **limited but locally concentrated**, primarily along the historic riverfront and older settlement areas. The distribution reflects the town's heritage character, where cultural activities are closely tied to specific nodes rather than being widely dispersed. While the number of facilities is relatively low, the spatial clustering indicates the presence of identifiable cultural zones.

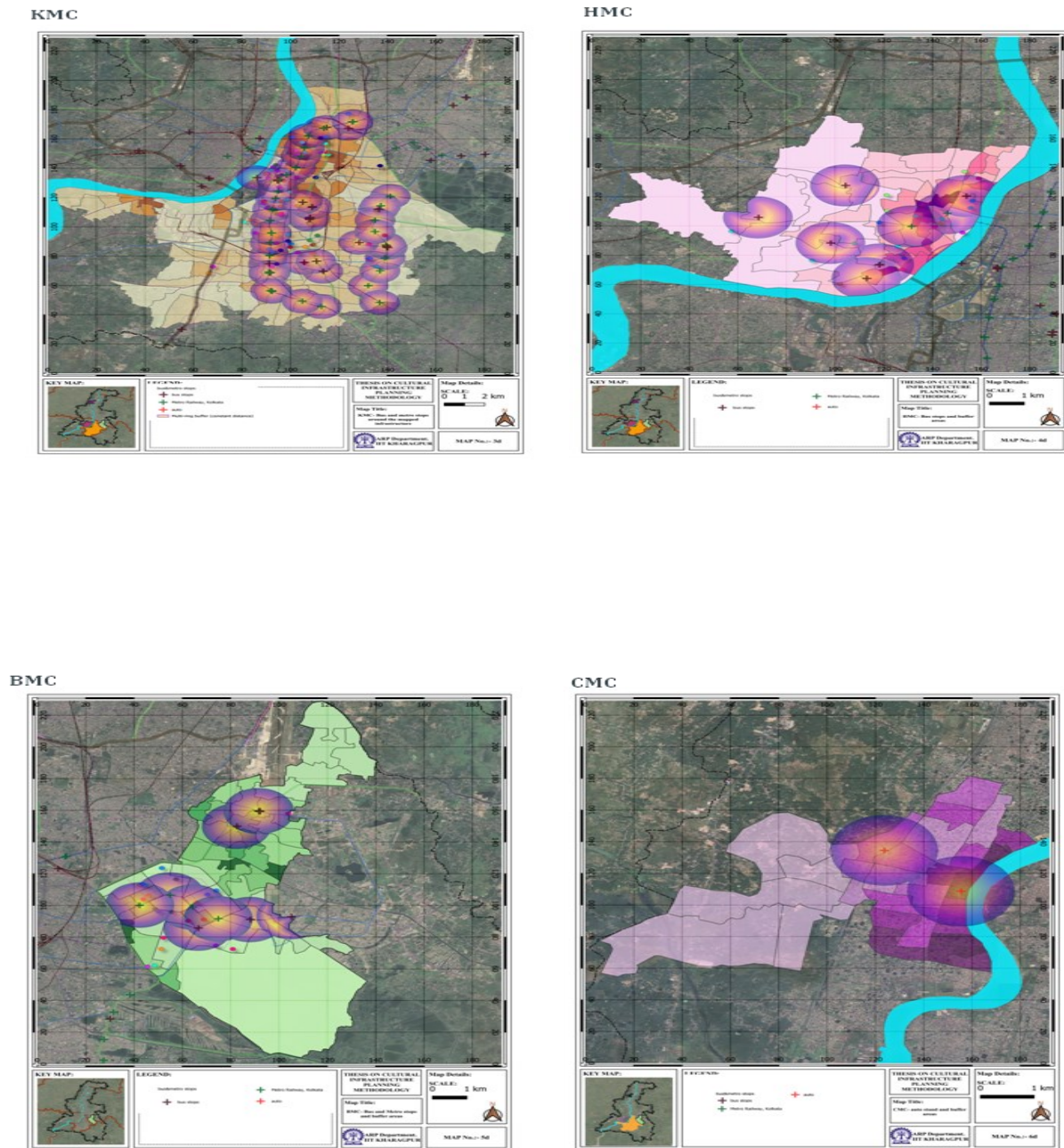


Figure 8-3: Accessibility buffers around the cultural infrastructure source (author)

Accessibility Buffer

The accessibility of cultural infrastructure was assessed using proximity to public transport networks, specifically bus stops and metro stations. Buffer zones were generated around these nodes to evaluate the extent to which cultural facilities are connected to public transport, thereby indicating their accessibility to users.

A **multi-distance buffer approach** was adopted, as seen in **Error! Reference source not found.** with zones defined at **1 km and 2 km radii** from bus stops and metro stations.

These thresholds represent walkable and extended accessibility ranges, capturing both direct pedestrian access and access through intermediate modes. In **Kolkata Municipal Corporation (KMC)**, the buffer analysis reveals a **high degree of overlap between transport networks and cultural infrastructure**. A significant proportion of cultural facilities falls within the 1 km buffer zones, particularly in central areas where metro corridors and dense bus networks are present. This indicates strong accessibility and reinforces the integration between cultural spaces and public transport systems. However, certain peripheral areas fall outside the 2 km buffer, highlighting gaps in accessibility despite the overall network density.

In **Howrah Municipal Corporation (HMC)**, the buffer coverage is comparatively **less dense**, with several cultural facilities located within the 2 km buffer but fewer within the immediate 1 km range. This suggests that while infrastructure is not entirely disconnected from transport networks, direct accessibility is relatively weaker. Some areas remain outside both buffer zones, indicating potential accessibility constraints.

In **Bidhannagar Municipal Corporation (BMC)**, the accessibility pattern reflects its **planned urban structure**, with cultural infrastructure generally located within accessible distances from major roads and bus routes. However, metro connectivity is limited to specific corridors, resulting in uneven buffer coverage. While most facilities fall within the 2 km range, fewer are located within the primary 1 km accessibility zone.

In **Chandannagar Municipal Corporation (CMC)**, the buffer analysis indicates **limited but locally effective accessibility**, with cultural infrastructure clustered within areas that are relatively well-served by only auto routes.

9. Conclusion

This study set out to address a critical gap in Indian urban planning—the absence of a structured and measurable approach to cultural infrastructure assessment. By developing a multi-dimensional, indicator-based framework, the research demonstrates that cultural infrastructure can be systematically evaluated, compared, and integrated into planning processes, moving it from an intangible concept to a quantifiable urban parameter.

The proposed Cultural Infrastructure Index, grounded in international best practices and adapted to local conditions, provides a replicable methodology for assessing cultural systems across cities. By incorporating both “hard” infrastructure indicators and “soft” dimensions such as participation, perception, and social dynamics, the framework captures the complexity of cultural ecosystems more holistically than conventional planning approaches.

The application of the framework to the selected municipal corporations reveals that cultural development is not solely dependent on the presence of infrastructure or economic investment. Instead, it is shaped by a dynamic interaction between human capital, community engagement, accessibility, and institutional support. The identification of distinct city typologies—ranging from economy-led to people-centric systems—highlights that different urban contexts require differentiated planning strategies rather than uniform solutions.

A key insight emerging from the study is the **infrastructure–engagement paradox**, wherein higher levels of cultural infrastructure do not necessarily correspond to greater participation or social impact. These findings challenge prevailing planning assumptions and underscore the need to shift from infrastructure-centric approaches toward more integrated, people-oriented frameworks that prioritize activation, inclusivity, and accessibility.

Domains	Indicators	Remarks
---------	------------	---------

Human Capital	% of graduates from arts/humanities	
	No. of art/music/dance schools	no of organisations/1000 people
	Cultural employment %	
Cultural Participation	Attendance at cultural venues per year	Based on bookings/year per 1000 people
	Income from movie theatres	income/population*1000
	Public opinion on art value	Percent of respondents from Houshold Survey
	Artists opinion on value of cultural venues	Percent of respondents from Opinion Survey
Cultural Infrastructure	No. of museums, libraries, galleries, theatres	number per 1000 population
	No. of Adaptive reuse of heritage into cultural venues	% wrt total heritage structures
	Accessibility to culture (walkability, transport)	Based on distance from public transit nodes
Creative Industries & Economy	Amusement tax paid by the institutions	Aggregate of all venues considering single event per capita
Institutional Framework	Zoning laws supporting culture	
	Cultural Policy presence	
Social & Spatial Dynamics	% Representation of women/minorities in arts	only based on iccr and ezcc empanelled list
	Civic & religious spaces used for culture	numbers per 10000 population

From a policy perspective, the research advocates for the inclusion of cultural infrastructure as a core component of urban planning and governance in India. This includes the development of dedicated cultural infrastructure plans, incorporation of cultural indicators in master planning processes, and greater emphasis on community-led and informal cultural practices. Additionally, strengthening data systems, institutional coordination, and stakeholder engagement mechanisms will be essential for effective implementation.

While the study is limited by data availability and its focus on a specific metropolitan context, the methodology offers significant potential for adaptation across other Indian cities and regions. Future research may expand the framework by integrating longitudinal data, exploring informal cultural economies in greater depth, and linking cultural indicators with broader measures of urban quality of life.

The observed relationship between cultural infrastructure and cultural participation should be interpreted cautiously because both variables may influence one another. While improved cultural infrastructure can stimulate greater participation by increasing accessibility and

opportunities, higher levels of participation may also encourage governments and institutions to invest further in cultural facilities. This reciprocal relationship introduces potential endogeneity, meaning that the observed associations do not necessarily imply a one-directional causal relationship. Consequently, the Cultural Infrastructure Index is intended primarily as a comparative planning and benchmarking tool rather than a causal explanatory model. Future studies using longitudinal data could examine the dynamic interactions between infrastructure investment and participation over time.

In conclusion, the study repositions culture from a peripheral or symbolic domain to a **central, measurable, and actionable component of urban development**. By bridging the gap between global frameworks and local realities, it contributes to building a more inclusive, vibrant, and culturally responsive planning paradigm for Indian cities.

Supplementary Material- AHP

For calculating a cultural score for each municipal corporation, there needs to be a pairwise comparison between each sub-indicator to derive the weightages using AHP.

The following list shows the total domains and their indicators, each of which has to be compared pairwise for all the domains having more than one sub indicator.

Saaty Rating Scale:

- **1:** Both domains are equally important.
- **3:** Left domain is moderately more important than the right.
- **5:** Left domain is strongly more important than the right.
- **7:** Left domain is very strongly more important than the right.
- **9:** Left domain is extremely more important than the right.

1. Domain: Human Capital

Indicator A	9	7	5	3	1	3	5	7	9	Indicator B
% Arts Graduates										No. of Art/Music Schools
% Arts Graduates										Cultural Employment %
Art/Music Schools										Artist Training Grants

2. Domain: Cultural Participation

Indicator A	9	7	5	3	1	3	5	7	9	Indicator B
Venue Attendance										Income from Movie Theatres
Income from Movie Theatres										Public Opinion (Value)
Public Opinion (Value)										Artists' Opinion (Value)
Artists' Opinion (Value)										Venue Attendance
Artists' Opinion (Value)										Income from Movie Theatres
Venue Attendance										Public Opinion (Value)

3. Domain: Cultural Infrastructure

Indicator A	9	7	5	3	1	3	5	7	9	Indicator B
No. of Cultural Infrastructure/capita										Accessibility (Transit)- nearest nodes
No. of Adaptive reuse of heritage into cultural venues										No. of Cultural Infrastructure/capita
Accessibility (Transit)-nearest nodes										No. of Adaptive reuse of heritage into cultural venues

4. Domain: Social& Spatial Dynamics

	9	7	5	3	1	3	5	7	9	Indicator B
% Representation of women/minorities in arts										Civic & public spaces used for culture

5. Domain: Human Capital

Indicator A	9	7	5	3	1	3	5	7	9	Indicator B
% Arts Graduates										No. of Art/Music Schools
% Arts Graduates										Cultural Employment %
Art/Music Schools										Artist Training Grants

6. Domain: Cultural Participation

Indicator A	9	7	5	3	1	3	5	7	9	Indicator B
Venue Attendance										Income from Movie Theatres
Income from Movie Theatres										Public Opinion (Value)
Public Opinion (Value)										Artists' Opinion (Value)
Artists' Opinion (Value)										Venue Attendance
Artists' Opinion (Value)										Income from Movie Theatres
Venue Attendance										Public Opinion (Value)

7. Domain: Cultural Infrastructure

Indicator A	9	7	5	3	1	3	5	7	9	Indicator B
No. of Cultural Infrastructure/capita										Accessibility (Transit)- nearest nodes
No. of Adaptive reuse of heritage into cultural venues										No. of Cultural Infrastructure/capita

Accessibility (Transit)-nearest nodes										No. of Adaptive reuse of heritage into cultural venues
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8. Domain: Social& Spatial Dynamics

Indicator A	9	7	5	3	1	3	5	7	9	Indicator B
% Representation of women/minorities in arts										Civic & public spaces used for culture

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Appendix 1: AHP calculation

The weights reported in the study were derived using the Analytic Hierarchy Process (AHP) based on expert judgments collected from professionals in urban planning, architecture, heritage conservation and cultural planning. Experts compared indicators within each domain using Saaty's nine-point pairwise comparison scale. The pairwise comparison matrices were normalized to obtain the principal eigenvector representing the relative importance of each indicator.

Example Pairwise Comparison Matrix

Cultural Infrastructure Domain

Indicator	Number of Facilities	Heritage Assets	Accessibility
Number of Facilities	1	5	3
Heritage Assets	1/5	1	1/3
Accessibility	1/3	3	1

Normalized Matrix

Indicator	Number	Heritage	Accessibility
Number of Facilities	0.720	0.600	0.500
Heritage Assets	0.144	0.120	0.167
Accessibility	0.240	0.360	0.333

Priority Vector (Eigenvector)

Indicator	Weight
Number of Facilities	0.584
Heritage Assets	0.144
Accessibility	0.272

Consistency Ratio

CR = 0.10

Human Capital Domain

Indicator	Weight
Arts Graduates	0.25
Number of Schools	0.08
Cultural Expenditure	0.67

Cultural Participation Domain

Indicator	Weight
Attendance	0.350
Movie Theatre Income	0.248
Public Opinion Survey	0.240
Artists Value	0.162

Social and Spatial Dynamics

Indicator	Weight
Public Space	0.334
Representation (%)	0.666

Summary of AHP Consistency

Domain	No. of Indicators	CR	Status
Cultural Infrastructure	3	0.10	Acceptable
Human Capital	3	<0.10	Acceptable
Cultural Participation	4	<0.10	Acceptable
Social & Spatial Dynamics	2	<0.10	Acceptable
Creative Economy	3	<0.10	Acceptable

Institutional Framework	2	<0.10	Acceptable
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