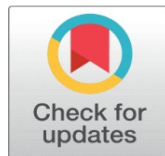


WEIGHTED MATRIX INDEX: A TOOL TO DECODE THE INTERCONNECTEDNESS OF SOCIO-CULTURAL EXPRESSIONS, URBAN CONTEXT AND BUILT ENVIRONMENT

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ABSTRACT

The ever-changing nature of our urban fabric reflects the complex cultural and socio-economic environment we live in. Globalization has brought with it a shift in the way we view our cities, from traditional urban forms that consider the wisdom and skills of our ancestors to analytical diagrams largely used to facilitate urban development. While this has resulted in a more efficient and convenient urban environment, it has also led to an insensitive and unresponsive urban fabric. Fortunately, there are examples of urban forms that have managed to preserve their significance over a long period of time, while still being adapted to the changing cultural and socio-economic contexts. These examples prove that it is possible to create places that are both timeless and responsive to the needs of the present and serve as inspirations for cities of the future. The purpose of this research study is to examine the role of design in shaping the continuity and change of urban fabric. Specifically, this paper investigates the relationship between contextual factors and design decisions that contribute to the evolution of the built environment in urban areas set in unique contexts. Within this framework, this paper aims to intricately compare and contrast Rome and Bhutan as distinctive urban environments, each situated within its own unique settings. This research study has used an approach that combines analysis of development processes, observation notes, documentary reports, published literature, and studies of case examples to investigate the relationship between design decisions and the continual change in the urban fabric. This factor, in particular underpins the relationship between the built environment and socio-cultural expressions that inform contextually appropriate design. A tool (weighted index matrix) for deciphering the interconnectedness between socio-cultural expressions, urban settings, and built environments was developed as a result of the research study. Further, the matrix index has been applied for the two select case examples and the results have been evaluated and analyzed.

Keywords: Urban Context, Built Environment, Socio-Cultural Expressions, Continuity, Weighted Matrix Index



1. INTRODUCTION

Human settlements embody the cultures that constructed them, shaped across generations by an evolving comprehension of environmental dynamics and societal needs. Yet, the built forms of these places can often outlive the society that created them, and globalisation has led to a shift in the way cities look and feel [Eldemery \(2009\)](#). The complex and multidimensional effects of advanced capitalism and neo-

liberal policies on urban form are still a topic of discussion among academics and decision-makers. While some contend that these policies have aided in the widening of social and economic inequalities in the built environment, others contend that they have facilitated urban growth and development. The livability, equity, and sustainability of cities have reportedly suffered as a result of these tendencies, according to evidence.

However, cities are remarkably resilient and have the ability to evolve and adapt over time in order to be timeless and relevant. There are numerous examples of urban forms that have adopted innovative and sustainable urban development techniques to maintain their significance while also transforming the constantly changing needs of their inhabitants [Glaeser \(2011\)](#).

For instance, cities like Paris, London, and Barcelona have been able to keep their traditional urban form and architectural style while simultaneously adjusting to contemporary needs. While new infrastructure and transportation systems have been developed in these cities to meet evolving means of transit and mobility, historic structures and neighbourhoods have been maintained and rehabilitated. There are other cities that have embraced social and economic inclusion, like Seoul, Barcelona, and Berlin. To address issues of inequality and social exclusion, these cities have implemented policies and programmes that assist small enterprises to enhance the quality of life while also providing affordable housing and community development projects. These examples demonstrate that it is feasible to design locations that pay respect to the past while also being a part of the present and can act as models for other cities.

Settlement patterns are the visible manifestations of a community's social and cultural ideals. A location's settlement pattern is shaped by the distinctive amalgamation of numerous urban components, including its streets, public spaces, green spaces, and built forms. The positioning and style of buildings can have a big impact on a place's character and significance. Therefore, while introducing new buildings, it is crucial to take the present style of architecture and the local setting into account. Early 20th-century modernist architecture frequently places an emphasis on originality, which can result in structures that don't fit in with their surroundings. The need to respect and enhance the local architecture could often be in conflict with this.

Nevertheless, it is possible to conceptualise innovative designs while simultaneously rendering respect to the existing built environment, historical relevance, and existing urban fabric. This strategy necessitates sensitivity to and comprehension of the situation and community needs. To preserve a location's cohesiveness and distinctive identity while also fostering growth and innovation, careful consideration of how new built form development may affect the existing urban fabric is crucial.

1.1. SOCIO-CULTURAL EXPRESSIONS, URBAN CONTEXTS AND BUILT ENVIRONMENTS

The relationship between socio-cultural expressions, urban context, and built environment is complex and dynamic, involving several variables and interactions. It refers to the extent to which closely related and interdependent a city's or urban area's physical, social, and cultural components are. It recognises that an urban area is more than just a physical location; it is also a space for culture and social interaction between people and the built environment.

The diverse means by which individuals display their culture and social identities, including language, art, music, religion, customs, and traditions, are referred to as socio-cultural expressions. The urban setting and built environment, which include components like geography, history, politics, economy, and technology, form these expressions, which have a strong social and cultural underpinning. A thriving street art scene, for instance, can transform a deteriorating neighbourhood into a cultural centre, and traditional religious beliefs can affect the design of religious structures and public spaces [Naghizadeh \(2000\)](#).

The urban context refers to the physical, social, and economic characteristics of urban areas, including their size, population, infrastructure, and built environment. Urban contexts can shape socio-cultural expressions by providing spaces and opportunities for artistic and cultural activities, as well as by influencing the social and economic factors that support or hinder these expressions [Granham & Thomas \(2007\)](#).

Buildings, streets, public spaces, and mobility infrastructure collectively comprise the built environment, which is crucial in determining both socio-cultural expressions and urban environments. Cultural expressions and activities, as well as the social and economic forces that sustain them, are impacted either positively or negatively by the way these places are designed and used. An opportunity for social contact and cultural expression, for instance, can be provided by the design of public areas like parks, plazas, and cultural institutions. Additionally, the urban environment can have an impact on the kinds of socio-cultural expressions that develop and flourish in a certain location. For example, while a homogenous or segregated urban context may limit the range and quality of cultural expressions, a diverse and inclusive urban context may encourage the emergence of new cultural expressions and creative practices (Refer [Figure 1](#)).

Figure 1

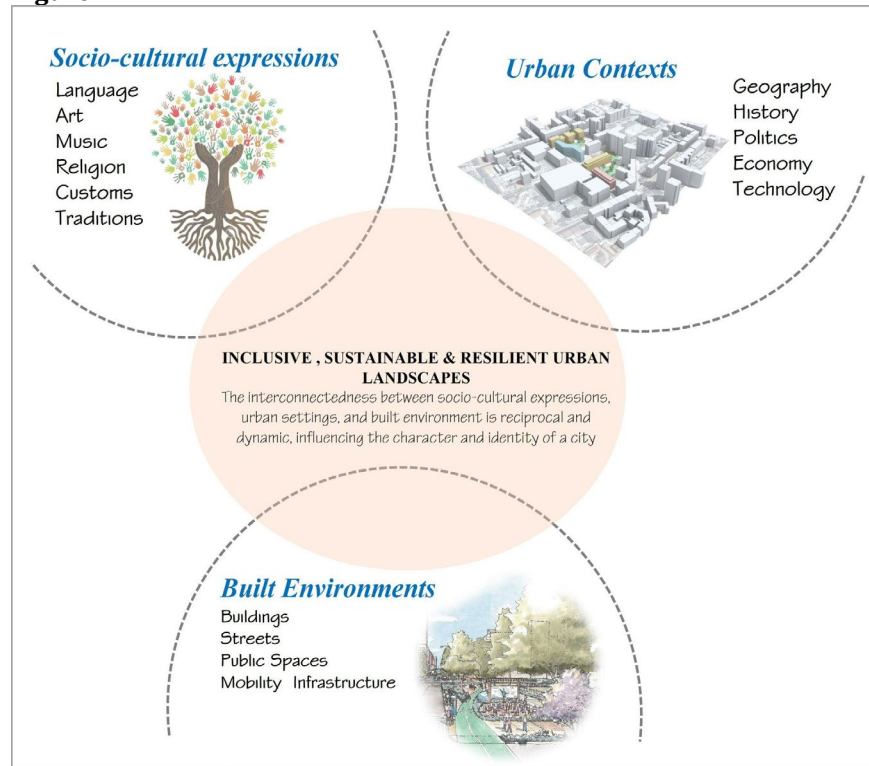


Figure 1 Significant Features of the Inclusive, Sustainable and Resilient Urban Landscapes
Source Authors

In this sense, the link between socio-cultural expressions, urban setting, and built environment is reciprocal and dynamic, influencing the character and identity of a city. Building inclusive, sustainable and resilient urban landscapes that enable a variety of socio-cultural expressions and encourage community involvement requires an understanding of these linkages and how they are interconnected.

2. MATERIALS AND METHODOLOGY

This research study is primarily focused on deciphering the interconnectedness of socio-cultural expressions, urban context and built environment. The research study explores the interrelation between contextual variables and design decisions that contribute to the evolution of the built environment in urban areas set in unique contexts. The theoretical framework of contextual settings and socio-economic expressions and the application framework of planning and design process have been used as underpinning premises for positioning the research study and the analysis. The research analysis is illustrated through the use of two case examples, each within its unique context. Further, a tool for recognising the interconnectedness between socio-cultural expressions, urban settings and built environments was developed as a result of the research study. The following methodology framework was established to conduct the research study (Refer [Table 1](#)).

Table 1

Table 1 Details of the Methodology Framework	
S. No.	Methodology Framework
1	Introduction
2	Materials and Methodology <ul style="list-style-type: none"> • Research Statement • Research Questions • Research Aim • Research Objectives • Research Methodology
3	<ul style="list-style-type: none"> • Socio-Cultural Expressions: Needs, Continuity and Spatial Characteristics • Architecture of the Built Environment - An Expression of the Socio-culture Fabric and Urban Context • Case Example 1: Rome – An Imperial City • Case Example 2: Bhutan- A Buddhist Kingdom <p style="margin-left: 40px;">Historicity</p> <p style="margin-left: 40px;">Reconnoitering the Interplay between History and Context</p> <p style="margin-left: 40px;">Exploring the Characteristics of Place</p> <p style="margin-left: 40px;">Synthesizing Context and Architecture: A Unified Approach</p>
4	<ul style="list-style-type: none"> • Comparative analysis of the case examples to co-relate the region's historical and contemporary development developed over a period of time • Formulation of a tool (weighted index matrix) for recognizing the connections between built forms, urban surroundings, and sociocultural expressions • Analysis and Results
5	Conclusion

Source Authors

2.1. RESEARCH STATEMENT

The research design of this study is based on a qualitative approach that emphasizes the exploration of complex phenomena in natural settings. The study employs case studies to investigate the specific design decisions that have been made in different urban contexts like Rome and Bhutan and their impact on the continuity and change of the built environment. The cases selected for this study are representative of different urban contexts and design approaches, including historic preservation, urban renewal, and contemporary development. Case studies involve an in-depth examination of specific design projects, including analysis of design documents and site visits, of both Rome and Bhutan.

The data collected through case using thematic analysis. This approach involves identifying patterns and themes such as a) Historicity, b) Exploring the interplay between history and context, c) Exploring the characteristics of place and d) Reconciling the realms of context and architecture that emerge from the data and developing a comprehensive understanding of the factors that contribute to the continuity and change of urban fabric.

2.1.1. RESEARCH QUESTIONS

- 1) What are the vital factors that strongly impact the interconnectedness of built forms, urban context, and socio-cultural expressions?
- 2) How do the cities of Rome and Bhutan compare in terms of Built Form, Urban Context, and Socio-Cultural Expressions?
- 3) How does the urban context differ between the two case examples?
- 4) Which case example has a strong socio-cultural expression?
- 5) Which case example has a comprehensive built environment?

2.1.2. AIM

The research study examines and compares the interconnectedness of the socio-cultural expressions, urban contexts, and the built environment of the selected case examples by applying the formulated weighted index matrix approach.

2.1.3. RESEARCH OBJECTIVES

- To signify the connectedness and correlation between inhabitants, built forms, urban context, and socio-cultural expressions.
- To explore the relevance and influence of unique contextual settings on the built environment.
- To explore the crucial development elements and their impact on the fabrication of the built environment which is essential in creating a sense of place.
- To formulate a tool (weighted index matrix) for recognizing the connections between built forms, urban surroundings, and sociocultural expressions.

2.2. METHODOLOGY

2.2.1. DATA COLLECTION

To collect data, information on the categories and subcategories listed in the weighted index matrix were gathered from a variety of sources. This entailed conducting a detailed analysis of existing literature, scholarly articles, research papers, and studies that scrutinize the urban planning and design facets of Rome and Bhutan. In order to collect pertinent information, official websites and internet resources like the Open Data Catalogue of the World Bank and the Human Development Index of the United Nations Development Programme were also consulted.

2.2.2. WEIGHTED INDEX SCORING

After the data was gathered, each category and subcategory received a weighted index score. According to the percentages supplied in the matrix, weights were assigned to each category and subcategory. To get a weighted score, the weightages given to each category and subcategory were multiplied by the scores for each case example. The weighted index score for each case example was calculated by adding all of the weighted scores for that particular case example.

2.2.3. COMPARATIVE ANALYSIS

The methodology's final step compared the weighted index scores of Bhutan with Rome. In terms of socio-cultural expressions, urban context and built environment. The scores were compared to highlight the similarities and contrasts between the two select case examples. Descriptive statistics, statistical analysis, and graphical representation are only a few of the approaches that were used in the investigation.

2.2.4. FINAL INTERPRETATION

The answers to the research study questions were used to interpret the findings. In doing so, conclusions about Rome's and Bhutan's urban planning and design features, as well as the elements that contribute to each place's distinctive character, were reached.

3. SOCIO-CULTURAL EXPRESSIONS: NEEDS, CONTINUITY AND SPATIAL CHARACTERISTICS

There is certainly much more to a city than its visible structures. It is a living thing that changes and evolves with time. A city's distinctive characteristics are influenced by its inhabitants, the cultures they develop, and the activities that take place there. Culture is embodied in various forms such as folklore, beliefs, lifestyles, rituals, built environments, and public spaces which in turn shape the landscapes of different societies. The way-built forms appear and function is primarily shaped by socio-cultural demands. To achieve a better design approach, one needs to respond to the context, which is commonly referred to as the 'setting', with a sensitive understanding. The interplay between the built environment and its context—spanning historical, political, socio-cultural, economic, and physical aspects—shapes the distinct identity of a place. There are three types of contextual references: visual context, formal context, and human context. Visual context refers to the visual

appropriateness of the built environment, while formal context is concerned with scientific environmental data. Human context, on the other hand, deals with cultural values and identity. Architecture stands the test of time when it harmoniously responds to both socio-cultural and physical environments [Radstrom \(2011\)](#).

3.1. ARCHITECTURE OF THE BUILT ENVIRONMENT - AN EXPRESSION OF SOCIO-CULTURE FABRIC AND URBAN CONTEXT

Architecture, as a cultural expression, shapes cities beyond buildings; it profoundly influences the continual renewal of the cities. Inhabitants' lifestyles shape building designs, dictating spatial use, layouts, and sizes. Enduring principles linked to land, climate, symbols, and organization persist across cultures, guiding the remarkable architecture of the settlement to encapsulate the essence of a place within urban landscapes, despite external changes. (Refer [Figure 2](#)).

Figure 2

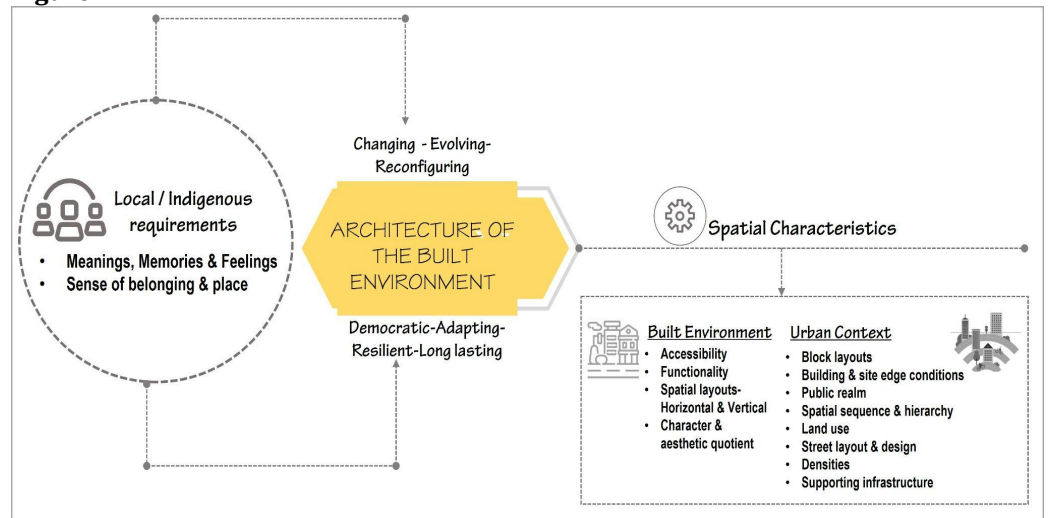


Figure 2 Architecture of the Built Environment - An Expression of Socio-Culture Fabric and Urban Context

Source Authors

The rich and varied experiences of the inhabitants representing heterogeneity of socio-cultural dimensions of a city are reflected in the diversity of the city, as are the different ways in which they engage with the urban contexts and the built environment. Leveraging a wide range of perspectives, knowledge, skillsets and resources, diversity enables cities to continuously change and adapt to challenges and new possibilities. This diversity is the primary component that makes urban areas dynamic, sustainable and resilient. Cities must embrace and celebrate this diversity in order to thrive in these dynamic circumstances. They must endeavor to build inclusive and equitable communities that meet the needs and ambitions of all of their inhabitants [Rossi \(1982\)](#).

3.2. CASE EXAMPLE 1: ROME – AN IMPERIAL CITY

3.2.1. HISTORICITY

Cities can provide a unique sense of belongingness and identity, even if they appear ordinary. Designed and constructed over time, cities are spatial constructs.

They are complex, intricate systems that require prolonged experience to properly comprehend. The imperial city of Rome serves as a notable illustration of this concept. Rome has had an immense impact on global architecture and urban planning, with a history spanning over twenty-eight centuries. The city's architecture comprises numerous layers, each reflecting the societal, economic, cultural, and political conditions of the time [Parvizi \(2009\)](#).

3.2.2. RECONNOITRING THE INTERPLAY BETWEEN HISTORY AND CONTEXT

Situated at the heart of the Italian peninsula, Rome was founded in 753 BC, located along the Tiber River. Legend has it that the city was constructed by twin brothers, born to a princess who was impregnated by Mars, and saved from drowning as infants by divine intervention. The brothers were raised by a she-wolf, revered as a sacred animal by their father [Niebuhr \(1851\)](#). Rome emerged as a cultural and political center, with adept engineers known for pioneering water systems and road networks, and much like the Greek Agora, Roman forums thrived as the vibrant hubs of civic life. After Julius Caesar's unification, Rome became a republic, elevating rulers to divine status and emphasizing imperial grandeur over religion. This shift prioritized the empire over religion, fueling a surge in monumental architecture across the Roman Empire facilitated by the innovation of lime concrete. The resulting structures—amphitheaters, aqueducts, theaters, basilicas, and temples—stand as an enduring testament to the grandeur of the era.

Figure 3



Figure 3 The Geographical Setting of Rome

Source [Ziolkowski \(2013\)](#)

3.2.3. EXPLORING THE CHARACTERISTICS OF PLACE

The Romans constructed buildings with a grand and imposing quality, evident in their use of materials such as limestone, concrete, and mortar. Notable examples of this monumental characteristic can be seen in structures like the Colosseum's

canvas roof (Velarium), Trajan's Column, the Temple of Saturn, and many more. Roman architecture employed several key building systems, including lintelled structures inspired by the Greeks, vaulted structures influenced by the Etruscans, and striking arcading, barrel vaults, domes, thick walls, decorative columns, fountains, sculptures, piazzas, squares, and the use of stone to adorn buildings. The images below depict some of the defining features of Roman architecture.

Figure 4

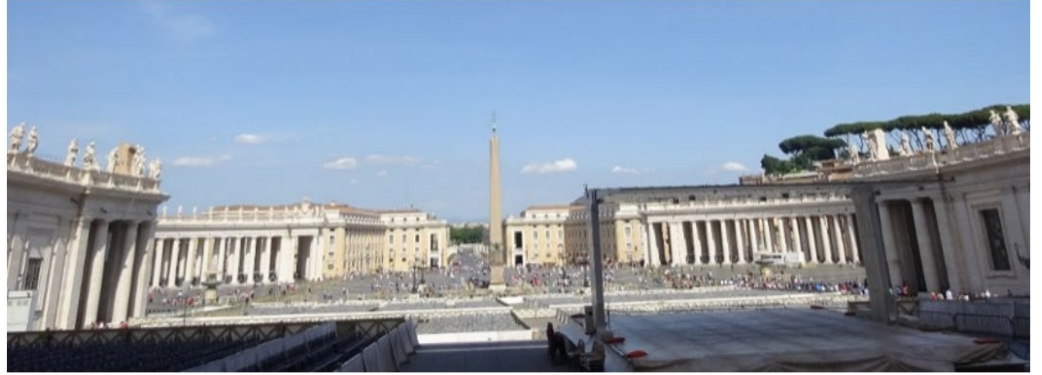


Figure 4 St. Peter's Square, Vatican City

Figure 5



Figure 5 Colosseum, Rome

Figure 6



Figure 6 Pantheon, Rome

Figure 7



Figure 7 Bridges Rome

Figure 8



Figure 8 Trevi Fountain, Rome

3.2.4. SYNTHESIZING CONTEXT AND ARCHITECTURE: A UNIFIED APPROACH

Rome's classical architecture profoundly influenced modern architectural design language. The city boasts a rich historical context that has evolved over centuries, with each part contributing to the whole and vice versa. Aesthetic coherence is crucial, and every element in a place must work together to create a sense of place. For instance, the streets of Boston's Beacon Hill neighborhood are aesthetically unified, which adds to their beauty. In contrast, the Tour Montparnasse in Paris draws attention to itself and is not in harmony with its surroundings. Capitalism can have a negative impact on culture, resulting in the creation of ugly places [Robinson \(2017\)](#).

Despite Rome's rich architectural heritage, many contemporary buildings in the city lack the design language of classical architecture and fail to respond to their

context. Instead, these buildings prioritize their own self-expression over fitting in with their surroundings. Examples of such buildings include Richard Meier's Ara Pacis Museum, Zaha Hadid's MAXXI, Renzo Piano's Auditorium Parco della Musica, and Massimiliano Fuksas's Rome Convention Centre.

Architecture and place are inherently intertwined. The factors that shape a building are important, but the connection to its immediate environment and thus its ability to fit in is equally important. For a building to be successful, it must be sensitive to its context and form a meaningful connection with its surroundings.

3.3. CASE EXAMPLE 2: BHUTAN - A BUDDHIST KINGDOM

3.3.1. HISTORICITY

Situated on the eastern edge of the Himalayas, Bhutan is a relatively small Buddhist kingdom. Despite this, traditional life and culture are still very prominent in Bhutan, with many of its citizens living a self-sufficient lifestyle and relying heavily on agriculture and cottage industries such as weaving and handicrafts. Additionally, Bhutan has been welcoming eco-tourism with its 'High Value Low Impact' policy, which has been helping to drive economic growth without harming the environment or culture. This policy aligns with Bhutan's Gross National Happiness (GNH), prioritizing the environment and culture over unchecked economic growth.

Figure 9



Figure 9 Settlement Map of Bhutan

3.3.2. RECONNOITRING THE INTERPLAY BETWEEN HISTORY AND CONTEXT

Buddhism deeply influences Bhutan's spiritual heritage. Bhutanese architecture embodies its socio-cultural essence, seen in its monuments, monasteries, and religious sites. The country spans diverse climates, from alpine regions in the Himalayas up north to sultry tropics in the south.

In its modern development phase, Bhutan is working towards preserving its traditional architecture's cultural relevance and sustainability. Government policies like Structure Plans, Local Area Plans, and Development Control Regulations aim to mitigate urbanization's negative impacts on the environment, culture, and architectural heritage.

Figure 10



Figure 10 Bhutanese Settlements: Harmonizing Traditional Architecture with Contemporary Built Forms and Physical Context

Source Authors

Figure 11



Figure 11 Bhutanese Settlements: Harmonizing Traditional Architecture with Contemporary Built Forms and Physical Context

Source Authors

3.3.3. EXPLORING THE CHARACTERISTICS OF PLACE

Bhutanese architecture, deeply rooted in culture, holds a distinctive identity. It embodies traditional values while interpreting various cultural aspects. Craftsmanship, seen in these impressive structures, emphasizes shared values over individual expression. These timeless monuments blend spiritual symbolism with organic and geometric shapes, standing as enduring testaments to both aesthetic appeal, functionality, and sustainability.

Figure 12

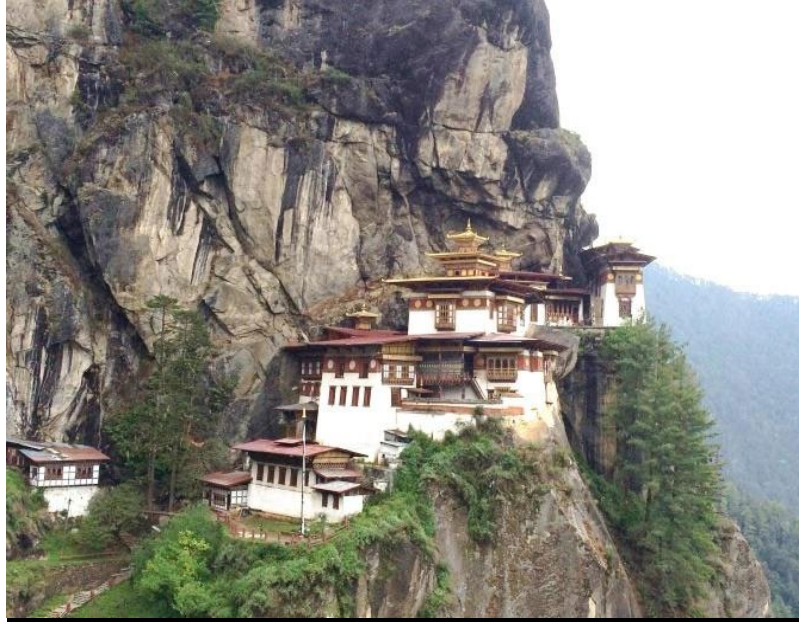


Figure 12 Taktsang Monastery: Embracing Nature in Architecture (left) and Tashichho Dzong: Traditional Essence portrayed (right)

Source Authors

Figure 13



Figure 13 Taktsang Monastery: Embracing Nature in Architecture (left) and Tashichho Dzong: Traditional Essence portrayed (right)

Source Authors

The notable structures prioritize practical function and aesthetics. While sharing design elements, every region has unique distinct architectural styles, utilizing local techniques, materials, and craftsmanship to cultivate visual richness, quality, and a sense of human scale. Bhutanese architecture, emphasizing sustainability and harmony with nature, reflects the nation's unique traditions and culture.

3.3.4. SYNTHESIZING CONTEXT AND ARCHITECTURE: A UNIFIED APPROACH

Bhutan's enduring traditional architecture signifies the nation's resilience despite limited military or economic strength. Amid global cultural shifts, Bhutan stands out for its commitment to preserving its distinct identity. Its architectural expressions remain vital in safeguarding this identity, showcasing how culture and climate influence structural design. Bhutan recognizes the power of its native architecture, utilizing it for both economic and aesthetic advantages.

4. COMPARATIVE ANALYSIS OF THE CASE EXAMPLES

Contemporary designs in revered settings should acknowledge and adapt to the city's enduring context, pivotal in its evolution. Analyzing both built structures and their surrounding systems is vital. Historical elements enrich the visual backdrop, influencing successful modern designs and forging new relationships between architecture and its surroundings. Striking a balance between honoring tradition and pursuing innovative approaches is key.

4.1. CONTEXT - A CONSTRAINT OR A DESIGN TOOL

Context should not be viewed primarily as a constraint, but rather as a tool that can help generate apt design solutions. Contextual data has an enormous influence on the built form and is essential in creating a sense of place. Contemporary times demand a re-conceptualization of context, and limitations should be viewed as an opportunity. Designing within a context demands more than mere conformity; it entails surpassing rigid form and style. Each context, unique in its values, demands a holistic analysis for the most appropriate solutions. Understanding the interplay between context and architecture involves considering various elements—built form, development patterns, vistas, scale, construction methods, and materials. The interplay between context and architecture is mutually influential, demanding a comprehensive analysis that correlates.

Tool for recognizing the interconnectedness of sociocultural expressions, urban contexts and built environment. Planners and designers may build urban environments that are not only practical but also meaningful and representative of the distinct identity of the community by taking the context, urban form, and socio-cultural manifestations of a city into consideration (Refer [Table 2](#)).

Table 2

Table 2 Tool for Comparative Analysis of Bhutan and Rome Based on Context, Urban Form, and Socio-Cultural Expression Factors

S. No	Category	Factors to Consider	Bhutan		Rome
1	Context Analysis	Historical and Cultural Heritage Context Masoud & Guan (2015)	Ancient history	Roman	Buddhist history and culture
		Geographical Context	located on banks of the Tiber river		Landlocked Himalayan Kingdom
		Political Context	Capital City of Italy		Constitutional Monarchy
		Economic Context	Developed economy with tourism and fashion industries		Developing economy with agriculture and tourism industries

2	Urban Form Analysis	Spatial Layout /streets network Jacobs (1961)	grid - iron systems with major road leading to historic landmarks	Organic street layout with winding roads and alleys
		open spaces Lynch (1960)	Piazas and public squares	Public plazas and Chortens
		Typology of Buildings Cuthbert (2006)	Monumental Public buildings, palaces and churches	Traditional Bhutanese architecture with dzongs and chortens
		Land use	Mix residential, commercial and government buildings	Dominated by religious and government buildings
	Socio - Cultural Expression Analysis	Cultural Traditional Practices/Religion Masoud & Guan (2015)	Paganism and Christianity in past, secular today	Mahayana Buddhism and Bon Tradition
		Language	Latin in past, Italian today	Dzongkha and numerous regional dialects
		Art and Aesthetics	Classical Roman Art and architecture, Renaissance art and sculpture	Buddhist iconography and traditional arts and crafts
		Social Customs	Emphasis on family, community, and social hierarchy	Emphasis on harmony, respect and spiritual; values

Source Authors

4.2. FORMULATION OF A TOOL: WEIGHTED MATRIX INDEX

A method to recognise the interconnectedness between socio-cultural expressions, urban context and built environment is provided by this tabular checklist. Planners and designers may build urban settings that are not only functional but also meaningful and representative of the distinct identity of the community by taking into account the socio-cultural expressions, urban context and the built environment. The ultimate objective is to develop livable, sustainable urban environments that honour and celebrate the various cultural customs and traditions of the neighbourhood (Refer [Table 3](#)).

Table 3

Table 3 Comparison of Socio-Cultural Expressions between Rome and Bhutan				
Parameters	Indicators	Score based on	Bhutan (SCORE)	Rome (SCORE)
Built Form (30%)	Building types (5%)	Variety and Adaptability of building types for different users	3	4
	Architectural style (10%)	Diversity and Quality of architectural styles	4	5
	Urban morphology (10%)	Legibility, Accessibility, and permeability of urban form	3	4
	Transportation Infrastructure (5%)	Availability and Accessibility of transportation modes	2	3
	Public space design (10%)	Quality, Accessibility, and Diversity of public spaces	4	5

Weightage			32.1	35.7
Urban Context (40%)	Location (10%)	Centrality, Accessibility and Connectivity of location	5	4
	Urban density (15%)	Population density and Urban sprawl	2	5
	Land use patterns (5%)	Mix and Balance of landuse	3	4
	Environmental conditions (5%)	Air quality, Water quality and Access to green space	5	3
Weightage			40.8	46.8
Socio - Cultural Expressions (30%)	Cultural practices (10%)	Diversity and Vibrancy of cultural practices and traditions, such as arts, music and cuisine	4.8	4.5
	Social values (10%)	Adherence to social values, such as respect for diversity, Inclusivity and Community engagement	4.5	4.2
	Demographics (5%)	Diversity and inclusivity of the population in terms of gare, gender, ethnicity and religion	3.8	3.3
	Socio - Economic status (5%)	Economic opportunities and Social mobility, as well as Income and wealth inequality	5	4.5
	Public participation (5%)	Level of civic engagement, Community involvement and Public decision making	4.5	4.6
	Total Score			42.6

Source Authors

4.3. ANALYSIS AND RESULTS

- 1) The Built Form category, which has a weight of 30%, is divided into its several subcategories in the table above. The Built Form category is used to assess a city's physical attributes, such as building kinds, architectural styles, urban morphology, transit systems, and public space layout. The weight and scoring criteria for each subcategory vary. For instance, the Rome and Bhutan ratings in the Building Types area are 4 and 3, respectively, and the subcategory has a weight of 5%. Based on the variety and adaptability of building styles for various functions, this subcategory's technique was developed. Lang (2005) and Mohanty (2011) are some of the sources cited for this subcategory. Similar to the subcategory of Architectural Style, which carries a 10% weighting, Rome and Bhutan received ratings of 5 and 4, respectively. The variety and excellence of architectural styles form the foundation of the methodology for this subcategory. Kostof (1991) and Pallasmaa (2011) are some of the sources cited for this subcategory. In general, the Built Form category offers a thorough evaluation of a city's physical layout and structure, taking into account a variety of elements including building types, architectural styles, urban morphology, transit systems, and public space design.
- 2) Urban Context - Location, Urban Density, Land Use Patterns, Environmental Conditions, and Economic Development are the five

subcategories that make up the context analysis category, which has a weight of 30%. The methods and weight for each subcategory vary, and sources are given for additional background and rationale. For instance, Rome and Bhutan both received scores of 4, which is 10% of the weight given to the subcategory of location. The centrality, accessibility, and connection of the site are the foundations for this subcategory's technique. [Bertaud & Malpezzi \(2003\)](#) and [Soja \(2010\)](#) are two sources cited for this subcategory. The scores for Rome and Bhutan are 5 and 2, respectively, in the subcategory of Urban Density, which has a 10% weighting. This subcategory's technique is based on urban sprawl and population density. [McGranahan and Satterthwaite \(2014\)](#) and [Pacione \(2005\)](#) are some of the sources cited for this subcategory. Context analysis gives a thorough evaluation of a city's livability and quality of life by taking into account a variety of criteria including location, urban density, land use patterns, environmental conditions, and economic development.

- 3) Socio-Cultural Expressions-Cultural Practices, Social Values, Demographics, Socio-economic Status, and Public Participation are the five subcategories that make up the Socio-Cultural Expression Analysis category in this table, which has a weight of 30%. The methods and weight for each subcategory vary, and sources are given for additional background and rationale. For instance, Rome and Bhutan both received scores of 4.5 and 4.8 in the Cultural Practices section, which has a 10% weighting. The technique for this subcategory is founded on the variety and vitality of cultural practices and traditions, including art, music, and gastronomy. [Throsby \(2001\)](#) as well as [Zhang & Huang \(2014\)](#) are cited as sources for this subcategory. The rankings for Rome and Bhutan are 4.2 and 4.5, respectively, under the subcategory of Social Values, which is similarly weighted at 10%. The criteria for this subcategory is founded on adherence to social ideals like respect for diversity, inclusivity, and involvement in the community. [Putnam \(2000\)](#) and [Sandercock \(1998\)](#) are cited as references for this subcategory. The weighted index calculation for the Socio-Cultural Expression Analysis category, in general, takes into account a variety of factors related to cultural practices, social values, demographics, socio-economic status, and public participation, and offers a more nuanced assessment of the livability and quality of life in a city.

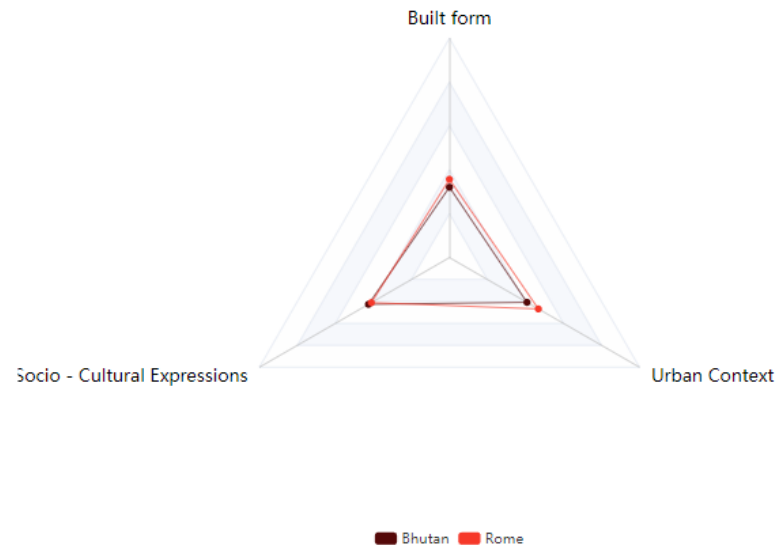
4.3.1. RESULTS

The items for each subcategory and category are added up to create the weighted index, which was then multiplied by the corresponding weight to produce the overall scores:

The weighted index for Rome is $(0.30 \times 35.7) + (0.40 \times 46.8) + (0.30 \times 41.1)$, which is 123.6.

Bhutan's weighted index is calculated as follows: $(0.3 \times 32.1) + (0.4 \times 40.8) + (0.3 \times 42.6) = 115.5$

Rome gets a better overall score than Bhutan according to this weighted index matrix. It's crucial to keep in mind that this is only one interpretation and weighting of the criteria, and that various scores or weights could provide different outcomes (Refer [Figure 14](#)).

Figure 14**Figure 14** Depiction of the Result Analysis of Select Case Examples

Source Authors

5. CONCLUSION

Cities are dynamic, ever-evolving entities that are not static. The spatial relationships between their many components can change and evolve as they develop, taking on new shapes and functions. This is evident in the ways that cities have developed and altered over the years as a result of planning and design frameworks, social and cultural norms, economic forces and new technologies. As a result, cities can develop over time in a variety of forms, reflecting the unique characteristics and identities of the people and cultures that inhabit within. However, despite their continuing growth and change, cities continue to have an inherent sense of continuity and historical significance. Many cities continue to possess historic sites, buildings, public spaces, and infrastructure as part of their built environment. Even while a city continues to grow and adapt in response to new opportunities and challenges, its rich legacy helps it lend a sense of belongingness and identity.

The reciprocal relationship and the interconnectedness between the socio-cultural expressions, urban context and the built environment emphasizes the critical consideration of it in the planning, designing and the development of urban areas. This research study's development of a weighted matrix index can be used as an effective checklist technique for addressing urban planning and design from a comprehensive point of view. The index provides a systematic and structured way to consider, evaluate and prioritize different variables in order to facilitate decision-making at multiple scales and levels by allocating weights to various socio-cultural expressions, urban setting, and physical environment factors that contribute to the overall character and identity of a city.

The weighted matrix index could be applied at several scales and levels, including the design of single structures or public areas as well as the development of entire communities or districts. This tool would enable decision-makers to develop development schemes that are not only functional but also meaningful and evocative of the distinct identity of the community. According to their relative

importance in a given situation, the weighted matrix index gives several factors weights. For instance, cultural significance can be given more weight than other considerations like economic feasibility in a community where protecting cultural heritage is a major priority. Decision-makers would be able to fabricate informed choices that represent the particular requirements and goals of the community by comparing various design solutions depending on how well they perform against these weighted criteria.

Applying a weighted matrix index in urban planning and design essentially aims towards creating spaces that are vital and expressive of the community's distinctive identity in addition to being functional and economical. Decision-makers can contribute to the creation of cities that are more inclusive, sustainable, and equitable by comprehending the way socio-cultural expressions, urban context, and the physical environment are interconnected and using tools like the weighted matrix index to inform decision-making.

CONFLICT OF INTERESTS

None.

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