DOI: 10.38027/N4ICCAUA2025EN0266

Chapter 4

Traces of Local Identity in High Rise Building façades in Manama, Kingdom of Bahrain

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Introduction

Manama's skyline has undergone rapid evolution in the past two decades, marked by the formation of high-rise buildings. This notable change results from a confluence of factors, including globalisation, rapid urban growth, and the liberalisation of real estate markets (Wiedmann, 2013), leading to a new era of architectural ambition and economic development. Almoayyed Tower, the first skyscraper built in 2004, was later surpassed by the Bahrain World Trade Centre (BWTC), which integrates large-scale wind turbines, symbolising the nation's commitment to sustainable development and technological innovation. The emergence of the fully glazed façades has elevated the city's image to new design directions, dramatically reshaping Manama's skyline and significantly departing from the predominantly low-rise, traditional structures (Ahmed, 2021). Although it is comparatively less aggressive than other Gulf cities, such as the Emirate of Dubai, the impact of modernisation on vernacular and traditional architecture has been significant and irreversible (Dayaratne, n.d.).

While these glass-clad skyscrapers have become potent symbols of modernity and economic prosperity, they also present challenges in creating culturally resonant spaces (Elkadi, 2006).

This architectural disconnect stems from a complex interplay of factors. First, globalization has played a significant role, encouraging the adoption of international design trends, often imported from Europe and the United States, which has led to a diverse array of building façades that, while visually striking, may lack a strong connection to the local cultural and environmental context (Abdel-Aziz & Shuqair, 2014; Assali, 2017; Salman, 2019). Second, technological advancement has led to the identical production of high-rise buildings (Faragallah, 2024). In other words, the uniformity in building designs led to a loss of local identity and a disconnect from the surrounding environment. Faragallah (2024) illustrates how high-rise buildings in the Arab region, which are recognised as significant energy consumers, often lack environmental considerations. Although attention has been given to addressing pressing ecological concerns, particularly in light of climate change, it has sometimes overshadowed considerations of cultural continuity in architectural design (Moscatelli, 2023). Therefore, new high-rise buildings are questioned about their implementation to withstand Bahrain's climate and to adapt to its cultural context.

Façades play a pivotal role in creating the identity of a place (Baper, 2024) by acting as cultural storytellers, environmental mediators, and visual anchors. Indeed, high-rise façades would be more potent in doing so due to their broader visual impact on communities. Coupled with Gaber et al.'s (2022) allegation that human minds communicate primarily with the visual character of buildings, recalling their images, not names. The buildings must represent an "emotional state" or a firm belief, or the building itself must be a great event and symbol that the people of the city or country relate to and be a reference for them to be proud of, to visualise memories strongly. Accordingly, Moscatelli (2023) asserts that the formal and plastic character of façades should evoke emotional cues referencing cultural values to secure their continuity. A "continuity of memory," as referred to by AbuOrf & Wafi (2020), that extends beyond merely copying traditional design vocabulary neither ""falsifying history" in search for identity that translates traditional values into "meanings, inspiration, and emotional rooting," targeting the present and aspiring to the future.

Undeniably, recently, the current high-rise façades are far from representing these values. Instead, the international design approach adopted led to the loss of cultural distinctiveness, resulting in identical solutions regardless of their locations. Although critical regionalism has gained traction since Frampton (n.d.) called for the

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How to Cite This Chapter:
Alfadhel, M., & Elghonaimy, I. (2025). Traces of local identity in high rise building façades in Manama, Kingdom of Bahrain. In Nikoofam, M., & Mobaraki, A. (Eds.), *Resilient Urbanism: Architecture, Equity & Innovation* (pp. 47–63). Cinius Yayınları.
https://doi.org/10.38027/N4ICCAUA2025EN0266

architecture of resistance that respects local culture, geography, and climate as a response to globalization's homogenizing effects, the fears of erasing regional architectural distinctiveness are transcending in parallel to the continuous adoption of global styles, leaving a widened gap between past and present. In Bahrain, particularly in Manama, a few notable buildings reflect the local identity, whereas many do not. The challenge here, and indeed for many rapidly developing cities, lies in striking a balance between embracing architectural innovation and maintaining a sense of place that reflects local heritage and values, a key concern of critical regionalism.

Based on this context, this study aims to examine the current design trends in high-rise building façades in Manama, focusing on the integration of innovative technologies and sustainable practices that contribute to the development of a local identity. Thus, the primary study question is: to what extent do those façades mediate the balance between local identity, innovation, and sustainability? To answer this question, it is first necessary to establish a theoretical framework that can assess local identity parameters in architectural designs. Then, the permanency of identity will be evaluated, as apparent in selected case studies from Manama's iconic structures. This analytical study is supported by a questionnaire directed to design experts to address their insights. Lastly, the goal is to synthesise actionable insights for culturally grounded sustainable design. A comparative evaluation of how other Gulf cities balance modernity with cultural heritage situates the study within broader architectural dialogues, strengthening its contributions to sustainable urban development.

In the study's conclusion, Manama's architectural transformation reflects the broader challenges that many cities face in the era of globalisation. While the emergence of high-rise clusters and iconic buildings has reshaped the city's skyline, it has also sparked meaningful discussions about cultural identity, sustainability, and the role of architecture in shaping urban experiences. As Manama continues to develop, the principles of critical regionalism, tempered by an understanding of the fluid nature of cultural identity, may offer a path towards creating a built environment that is both globally competitive and locally meaningful. The following section discusses the main definitions, theoretical frameworks, critiques, and existing empirical models for measuring identity. This is followed by an explanation of the adopted methodology and an analysis of the methods used. The final sections present the main findings of this study, which suggest a framework for reflecting local identity in sustainable architectural façades.

Identity

The term identity, as defined in the Oxford Learner's Dictionary, encompasses an individual's or entity's intrinsic characteristics and distinguishing feelings, beliefs, or attributes that differentiate them (Oxford University Press, 2025). Nevertheless, Salman (2019) extends this definition to include collective identities ranging from a group of people to a society, a country, or even a nation. Moreover, Garg & Mahima (2020) attribute identity distinction to social behaviour, cultural practices, local traditions, political aspects, the history of a place, religious identity, or essential landmarks. In architectural discourse, Kumaraku & Pula (2023) delineated two dimensions of identity. First, objective identity refers to the internal characteristics of the building, which are rooted in its material character. Secondly, a subjective identity is linked to external conditions and is determined by the building's interpretation. The latter dimension aligns with Leach's (2003) assertion that identity is a fluid and multifaceted concept, a view supported by many scholars. For example, Mahgoub's (2007) study on architecture and the expression of cultural identity in Kuwait interviewed eighteen Kuwaiti architects, who unanimously linked identity to climate, region, and culture, with some also including religion. Conversely, they held discordant views about architectural identity expressions, which range from the identical replication of traditional elements to symbolic and metaphorical reinterpretations that suit contemporary needs. Whereas Dayaratne (2016) believes that the non-static, multifaceted nature of identity suggests it is developed by more than just the revitalisation of the vernacular, but rather that the vernacular offers a veneer of that identity, which is rooted in the past and can be projected into the future. Similarly, Salman (2019) views vernacular architecture as a medium that symbolises identity, mirroring a nation's place, time, and culture.

Moreover, Adebayo et al. (2013) argue that identity is established fundamentally by considering the cultural aspects and historical context of a person, group, or region. In this view, local identity is not an inherent or static attribute; instead, it is constructed through the dynamic interplay of cultural practices, values, and collective memory. Salman (2019) and Shao (2014) similarly emphasise that culture is central to forming and expressing local identity. Masri et al. (2024) call for integrating heritage into urban development to ensure that cultural identity is at the essence of shaping evolving cities. This perspective aligns with Garg & Mahima (2020), who contend that architecture is not merely a passive reflection of culture but an active agent in its evolution and redefinition. Thus, culture comes to the fore whenever the concept of identity is discussed.

Architecture serves as a powerful medium for cultural expression and transmission, which is necessary for constructing identity (Adebayo et al., 2013; Al-Hoshary & Hamza, 2023; Masri et al., 2024). It translates intangible cultural values, traditions, and historical narratives into tangible forms—buildings and urban spaces— that reflect and shape urban identities. As Rapaport (1977) and Assali (2017) noted, architecture bridges the gap between the

abstract dimension of cultural identity and the concrete realities of the built environment, addressing both aesthetic preferences and functional requirements.

The expression of cultural identity in architecture is inherently varied (Figure 1). As posited by Neil Leach, the fluid nature of cultural identity in an increasingly globalised world challenges the notion of a fixed local identity that can be easily preserved or expressed through architecture. Some architects draw inspiration from historical styles and vernacular techniques, viewing cultural identity as rooted in the past and embodied in traditional forms and materials. In contrast, others prioritise contemporary values and future aspirations, creating modern designs that reflect the evolving cultural values and ambitions of their time (Mahgoub, 2007). This duality is evident in the blending of traditional and contemporary elements, which acknowledges both historical roots and future directions (Garg & Mahima, 2020). Such synthesis is crucial for creating architecture that resonates with local cultures while remaining relevant in a rapidly changing world.

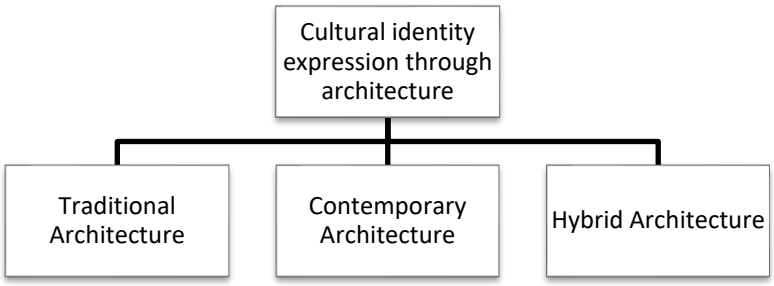

Figure 1. Cultural Identity Representation Approaches (Developed by the Authors).

Critical regionalism offers a theoretical framework that advocates for a balance between global modernist principles and the preservation of local cultural and geographical contexts (Abuorf & Wafi, 2020; Norouzi & Khademi, 2021). It seeks to resist the homogenising effects of globalisation by grounding architectural practice in the specificities of place—climate, topography, local materials, and cultural traditions—while embracing technological advancements. Abuorf & Wafi (2020) and Norouzi & Khademi (2021) highlight that critical regionalism advocates for an architecture that is both modern and contextually grounded, fostering a sense of place and belonging.

Nevertheless, critical regionalism is not without its challenges. Eggener (2002) critiques the approach for its potential to marginalise the diversity it seeks to champion, particularly in rapidly developing cities like Manama. Critical regionalism remains a valuable lens for addressing contemporary architectural challenges despite these critiques. Considering geographical factors such as climate, light, topography, and local tectonic forms can provide a means to maintain regional identity while embracing modern architectural innovations (Norouzi & Khademi, 2021). The Bahrain World Trade Centre exemplifies this approach, integrating wind turbines that respond to local environmental conditions within a contemporary architectural framework. Such projects demonstrate how architecture can mediate between tradition and modernity, ensuring that urban environments remain meaningful, sustainable, and culturally vibrant.

The manifestation of cultural identity in architecture has gained traction as a critical response to the modernisation processes that prioritise Western architectural paradigms, often at the expense of local cultural identity (Moscatelli, 2022). Therefore, various theoretical frameworks have been proposed to understand and measure local identity, each offering unique perspectives and methodologies.

Recently, Baper's (2024) model addresses the lack of comprehensive metrics measuring architectural identity by focusing on façade characteristics as cultural signifiers and proposing a new model that includes three key pillars: mental image (collective perceptions of place), originality (distinctiveness from globalized norms), and building regulations (institutional influences on forms) as the main identity-influencing parameters. In contrast, Shao (2014) adopts a holistic approach, framing local identity through four interactive aspects: physical (materiality and geometry), social (communal practices), sensory (emotional engagement), and memory (historical continuity). This model emphasises the interaction between humans and their environment, bridging between concepts of cultural identity, place identity, personal identity, and community identity.

On a larger scale, Oktay (2006) links urban identity with sustainability, focusing on the integration of natural, social, and built elements. Urban spaces reveal their character through their architecture. Thus, architecture emerges as the most influential visual element, evoking sensory experiences that reinforce identity. Meanwhile, Kumaraku & Pula (2023) decipher architectural identity based on three defining plans: formal (spatial organisation), stylistic or linguistic (aesthetic language), and technological (construction methods). The construction methods as identity markers were absent in Moscatelli's (2023) and Shao's (2014) models. Instead, Moscatelli (2023) acknowledges the ability of formal and plastic characters to transmit cultural values. Thus, she identifies four criteria for cultural transmission through forms: compositional aspects (spatial hierarchy), plastic figuration (sculptural quality), expressive value (symbolism), and context connection (site responsiveness). While

both Kumaraku and Pula (2023) and Shao (2014) emphasise materiality and geometry as identity carriers, they reject superficial stylistic limitations, advocating for a deeper cultural resonance.

Finally, the fluidity of identity possesses measurement challenges that arise from its contextual and temporal qualities (Adebayo et al., 2013). To address this, a new model grounded in critical regionalism is conceptualised to provide a roadmap for architects to design high-rise buildings that are visually distinctive, temporally resilient, and culturally vibrant.

Table 1. Classification of Identity measure models according to their focus, design parameter, and limitation (Developed by the Authors).

Model/ framework	Focus	Parameters/ dimensions	Limitation
Shao (2014)	Local identity Emergent from lived experiences (ideological) Shaping the urban identity	Physical Social Sensory Memory	• Although environmental aspects are touched on through the physical dimension (architecture, natural elements, and landscape), there is less emphasis on how environmental sustainability or ecological practices help define local identity. • Local identity could also be influenced by political factors or governance structures, such as how city policies, planning decisions, or community initiatives contribute to a sense of belonging.
Baper (2024)	Evaluative Approach Façade Identity Fostering innovations, compliance	Originality, Building regulation, mental images	• Lack of an analytical breakdown of architectural components • By concentrating on originality and visual impact, the model might insufficiently address the rich contextual influences conveyed by cultural or regional factors.
Moscatelli (2023)	Architectural identity	Compositive aspects, Plastic figurations Expressive value, Context connection	•
(Kumaraku & Pula, 2023)	Descriptive approach, Representative identity Internal qualities vs Externally imposed phenomenological	Formal Stylistic Technological dissection	• By viewing identity through multiple rather than prioritised lenses, comparisons between buildings may become more subjective when one aspect is more critical than another.
(Oktay, 2005)	Cultural sustainability	Physical, social, cultural, ecological, and temporal	• The economic and functional aspects of city life also contribute significantly to identity. • The evolution of local economies, the balance between tourism and local trade, and the functionality of urban spaces (that host a mix of uses) all influence how a city is experienced and remembered.

Local Identity Parameters for High-rise Buildings' Façades

Context is a perspective that shapes architectural design, encompassing the historical, social, cultural, and physical aspects of an architectural identity (Baper, 2024). Therefore, to identify local identity parameters for high-rise buildings from a critical regionalism lens, it is imperative to incorporate both contemporary innovations and a region's unique, context-specific attributes. The following is a theoretical framework and explication that synthesises key parameters from identity studies and critical regionalism theory.

Contextual integration

Context in architecture refers to the interconnected physical, cultural, social, and environmental conditions that shape how a building is designed and perceived within its surroundings. It encompasses both tangible and intangible elements.

a. Physical Context: Natural Elements and Built Environment: Site response, orientation, passive environmental considerations, and views and vistas.
b. Cultural Context: Heritage expressions
    - Metaphoric Forms: Metaphorically employing shapes or features that relate to local culture or landscape. It enhances the building's more profound meaning to be successful. It allows the viewer to draw their symbols and interpretations on it, where people repeatedly try to stand in front of these architectural masterpieces to uncover their moral and symbolic connotations. (Gaber et al., 2022)

- Symbolism: Distinctive Skyline Presence: Creating a unique, recognisable silhouette that contributes to city identity
- Meaning and Narrative: Having a story about the building is one of the reasons for its iconicity, as it creates a sense of mystery and sparks people's passion to talk about, visit, and take memorial photos next to it. The more stories and legends that are told about the building's history, the more people become attached to it, and the building becomes classified as an icon from their perspective.

c. Social Context
- Pedestrian Experience: Prioritising human-scale interactions at the street level
- Base-Middle-Top Articulation: Differentiating building zones to address both street-level and skyline presence

Innovation

Using modern construction techniques, Technological innovations in high-rise buildings can manifest in various areas, including geometric form, construction, materials, vibration-damping systems, and energy efficiency. The development of computer technology has facilitated the design of high-rise buildings with complex structural and functional solutions. Increased computing power has enabled the development of more advanced engineering programs, which better simulate the actual behaviour of a structure when building models (Szolomicki & Golasz-Szolomicka, 2019). Remarkably, technological advancements have paved the way for adopting international styles in Arab regions. However, modern technologies should consolidate the continuity of architectural identity on building façades. (Assali, 2017).

Materials and Methods

This study employs a qualitative approach to analyse the manifestation of local identity in the façades of high-rise buildings in Manama, Bahrain. Theoretical grounding has laid the foundation for the analytical study of selective high-rise buildings in Manama by constructing an identity parameter model to evaluate the reflection of identity in these case studies. In parallel, a web-based questionnaire was conducted to gain deeper insights from the viewpoints of architects and stakeholders regarding their perspectives on trends in high-rise buildings in Bahrain. The survey consisted of a self-administered questionnaire featuring a mix of multiple-choice questions, Likert scale questions, and open-ended questions formatted in Google Forms and disseminated to a group of experts in the field of architecture. Finally, a comparative analysis with similar Gulf-region cities was done to enhance the study's validity. (Figure 2)

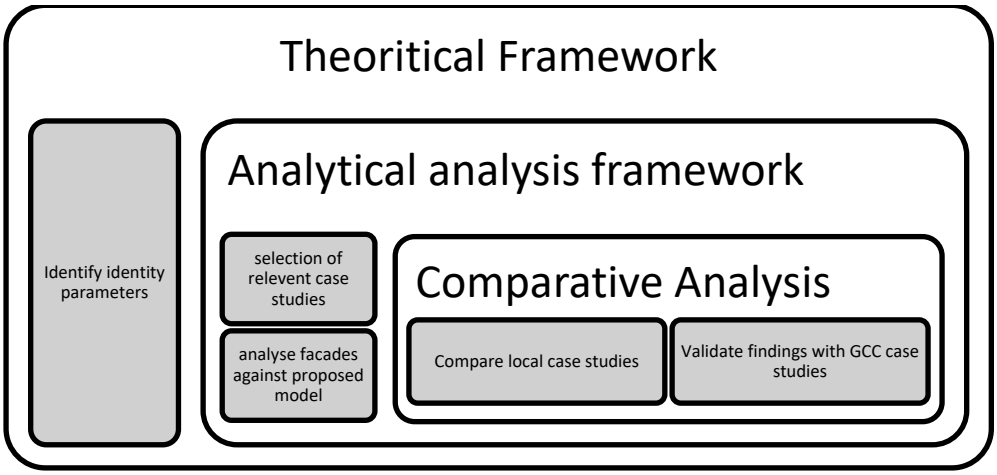

Figure 2. The methodology adopted in the study (Developed by the Authors).

Figure 3. The Case studies are localised in the city (Developed by the Authors).

Case Study

The case study selection criteria were based on location, technological advancement, temporal and typological range, and design strategies.

- Location: The Bahrain Financial Harbour to souq axis has been symbolically perceived as the axis of evolution of Bahrain as a nation, as it rhythmically connects the many nuanced approaches that extend from historicism to globalisation (Masri et al., 2024). Due to this critical reference, the selected projects were located within 3.5 km of it and had distinct temporal and typological ranges, addressing various design influences over that period. (Figure 3)
- Temporal Range: The selection of buildings encompasses a variety of completion dates, ranging from the 1980s to 2025.
- Typological Range: Commercial and Mixed-Use Buildings
- Design Strategies: Pragmatic, iconic, analogical, canonic, symbolic, and metaphoric.

Visual survey

The aim is to document notable high-rise buildings with more than 15 floors, within the selected predefined location (Figure 3) and classify them in a matrix to finalise the selection of case studies: Table 3, Table 4.

The Council on Tall Buildings and Urban Habitat (CTBUH) established international standards for measuring and defining tall buildings, which can be summarised as the relationship between height and context, proportion, and the integration of relevant technologies in tall buildings (*Tall Building Criteria*, 2025).

The United Gulf Bank has 12 floors, yet it was selected due to its historical significance.

Table 3. Visual Documentation of the Evolution of High-rise Buildings in Manama, Bahrain

	Residential	Commercial	Mixed Use
1980		 United Gulf Bank	

1988		 National Bank of Bahrain	
2004		 Almoayed Tower	
2005		 Alzamil Tower	
2008		 Bahrain Financial Harbor	 BWTC
2015		 Four Seasons Hotel	
2016			 Amfa Tower 2
2019	 Amfa Tower	 Sayacorp Tower	
2021		 GrandSwiss BelHotel waterfront	 Harbour Heights

2024	 Onyx Towers		

Table 4: List of Selected Case Studies (Developed by Authors)

	Building Name	Architect	Year	Typology	Design Strategy	Floors No
1	United Gulf Bank	Skidmore, Owings & Merrill LLP (SOM)	1980	Commercial	Canonic	12
2	Alzamil Tower	Gulf House Engineering	2005	Commercial	Symbolic	
3	Bahrain World Trade Centre (BWTC)	Atkins	2008	Commercial with mixed use	Iconic	50
4	Four Seasons	Skidmore, Owings & Merrill LLP (SOM)	2015	Hotel	Iconic	68

Questionnaire Design

A well-designed questionnaire ensures a reliable and accurate data collection. This questionnaire is designed to validate the discussion and avoid any bias. First, it gathers demographic information such as Nationality, Residency Status, Profession and Years of experience. Second, seven open-ended questions are presented in proper flow to address the interviewees' perspectives regarding the status of existing buildings, opportunities and challenges, and the role of technology in manifesting local identity.

A total of 33 participants responded to the web-based questionnaire, most of whom were Bahraini residents with diverse design backgrounds. Notably, more than 48% of respondents had over 15 years of professional experience in the field, lending significant expertise to the survey results. (Figure 4)

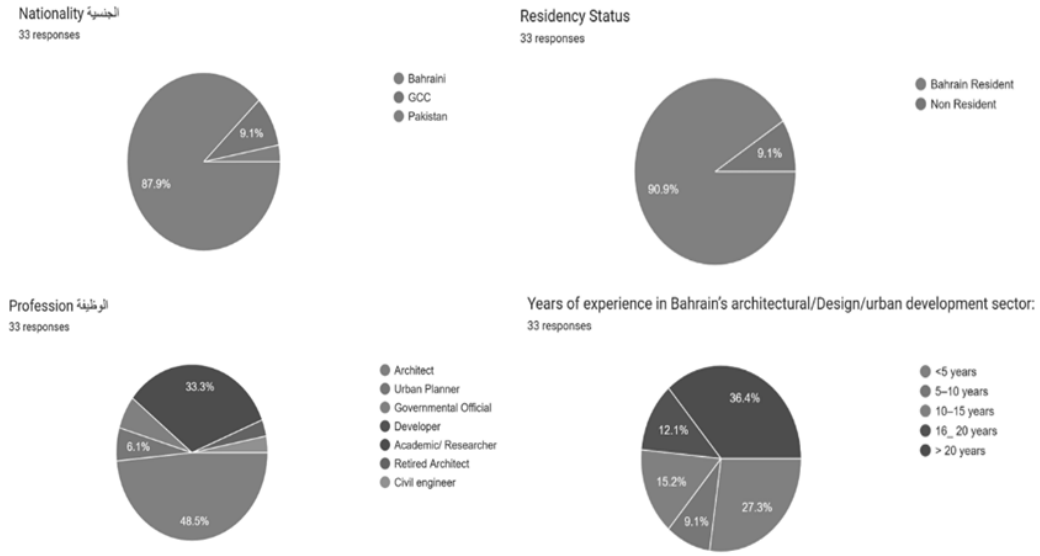

Figure 4. Participant Demographic Information.

Results and discussions

Traces of Local identity in the Selected case Studies

a. Gulf United Bank

i. Contextual Integration:

Cultural Symbolism: Curved façade inspired by Bahrain's traditional fishing boats (dhows), with green glass fins mimicking the Persian Gulf's emerald waters. Arabesque glass-block terraces and atrium reinterpret Islamic geometric patterns in modernist forms. Climate Response: Deep-set

windows and pre-cast concrete lattices reference vernacular heat-resistant walls, while transoms filter harsh sunlight. Urban Harmony: 12-story scale respects Manama's low-rise 1980s skyline, with a shaded arcade blending into the pedestrian streetscape.

ii. **Innovation:**

As for its time, Pre-cast concrete exterior incorporates deep-set windows and green glass fins to mitigate solar heat, referencing both local architectural sunscreens and the Gulf's emerald waters.

b. Alzamil Tower: A striking example of contemporary architecture that blends traditional Bahraini motifs with modern design. Won the **Aga Khan Award for Architecture (2007)** for its successful synthesis of heritage and innovation (Gulf House Engineering, 2021)

i. **Contextual Integration:**

The architectural concept dwells on the theme of the new emerging from the old," says Yasser Yacoub, manager of the engineering department at Gulf House Engineering. "To convey this theme, the towers feature granite skirting at the base which blends into natural stone cladding at the lower levels, incorporating elements of Islamic architecture, and then into modern precast and aluminium and curtain-walling featuring high-performance tinted glass. The taller tower flares outwards towards the top of the concave-shaped building. The other tower tapers in a stepped fashion from the 9th floor." ("Zamil Tower to Be the 'gateway' to Manama," 2002)

Morphological Bridging: The lower floors feature transformed Islamic motifs that respond to the historic fabric of Manama Souq, while the upper tiers adopt a sleek, modern aesthetic.

Urban Gateway: Twin towers linked by an overpass create a symbolic entrance to the souq, blending traffic flow with cultural monumentality.

ii. **Innovation:**

Early example of "hybrid heritage" design in Gulf high-rises, using parametric modelling to abstract traditional patterns.

The structure utilises pre-cast concrete elements and lightweight steel systems for efficiency, while the incorporation of structural glazing enhances both aesthetics and performance.

c. BWTC

i. **Contextual Integration:**

Tapered, elliptical profiles act as aerodynamic foils, channelling wind between the towers while evoking the region's sailing culture.

Sail-shaped towers (240m tall) draw inspiration from traditional Arabian wind towers and trading ships, creating a visual link to Bahrain's maritime heritage

Three skybridges with integrated wind turbines form a striking silhouette, symbolising Bahrain's modern economic ambitions

Iconic lighting displays (e.g., National Day celebrations) transform the towers into a shared cultural symbol, raising awareness for social causes

ii. **Innovation:**

World's first integrated wind turbines (29m diameter) generate 11–15% of the building's energy, supported by computational fluid dynamics and wind-tunnel testing.

Double-glazed, gas-filled windows and energy-recovery systems minimise thermal load, aligning with Bahrain's post-oil sustainability goals.

Panoramic elevators and innovative infrastructure (e.g., Otis' high-speed lifts) enhance user experience while showcasing cutting-edge engineering.

d. Four Seasons Hotel

i. **Contextual Integration:**

Cultural Metaphor: Sail-shaped towers evoke Bahrain's maritime heritage, with their north-facing orientation funnelling Gulf winds.

ii. **Innovation:**

Two textured concrete piers that support a stack of 17 hotel floors at lower elevations and two restaurant and conferencing floors at the building's summit.

Energy-efficient systems and thermal management in the glass curtain walls mitigate the Gulf's extreme climate.

The case study analysis summarised in Table 2 revealed various traces of cultural representations in high-rise buildings, each reflecting the cultural context of its era and location. However, as you track these developments chronologically, it is evident that the new developments are accelerating towards being completely glass-finished. Despite criticisms about their environmental impact, glass skyscrapers remain popular due to their economic benefits and the sleek, transparent aesthetic they offer. Architects like Ken Shuttleworth have called for a shift away from all-glass buildings, citing concerns about energy efficiency (Astbury, 2025). Studies indicate that glass

buildings require excessive air conditioning in the summer and lose heat in the winter. However, the trend of building glass skyscrapers is accelerating because glass curtain walling is an efficient and economical solution, and there is a continued obsession with a sleek, transparent aesthetic. New technologies are emerging to enhance the thermal efficiency of glass, but critics argue that reducing the amount of glass used would be a more effective approach. Therefore, we should take steps to use more contextually appropriate alternatives, reducing the amount of glass and incorporating other materials to better preserve cultural heritage.

Table 2. Case Study Analysis (developed by the Authors)

		Physical	Cultural	Social	Technology
1	**UGB**	Pre-cast Concrete Exterior Wall: References the thick, heat-resistant walls and latticed sunscreens found in local architecture. Solar Orientation and Deeply Recessed Windows Green Glass Fins	Design draws on the rounded form of Bahrain's traditional fishing boats The building's colour scheme alludes to the natural palette of the region: the emerald-green waters of the Persian Gulf and the pale beige sand of the desert Dhow-inspired curves	The three-story arcade at ground level provides shaded pedestrian access, aligning with regional urban traditions of shaded walkways.	Pre-cast concrete exterior incorporates deep-set windows and green glass fins to mitigate solar heat, referencing both local architectural sunscreens and the Gulf's emerald waters.
2	**Alzamil Tower**	Gateway Concept: The tower spans Khalifa Avenue, serving as a symbolic gateway to Manama's historic souq. This design reinforces its role as a transitional landmark between the historic city centre and the modern business districts.	The tower's lower levels incorporate intricate traditional Islamic and Bahraini motifs, responding to the historic context of nearby old buildings, while the upper floors transition into a sleek, modernistic form.	The bridge connecting the two towers over Al Khalifa Road acts as a symbolic gateway to the Manama souq, reinforcing its role as a physical and cultural landmark.	The structure utilises pre-cast concrete elements and lightweight steel systems for efficiency, while the incorporation of structural glazing enhances both aesthetics and performance.
3	**BWTC**	Tapered, elliptical profiles act as aerodynamic foils, channelling wind between the towers while evoking the region's sailing culture.	Sail-shaped towers (240m tall) draw inspiration from traditional Arabian wind towers and trading ships, creating a visual link to Bahrain's maritime heritage. Three skybridges with integrated wind turbines form a striking silhouette, symbolising Bahrain's modern economic ambitions.	Iconic lighting displays (e.g., National Day celebrations) transform the towers into a shared cultural symbol, raising awareness for social causes.	World's first integrated wind turbines (29m diameter) generate 11–15% of the building's energy, supported by computational fluid dynamics and wind-tunnel testing. Double-glazed, gas-filled windows and energy-recovery systems minimise thermal load, aligning with Bahrain's post-oil sustainability goals. Panoramic elevators and innovative infrastructure (e.g., Otis' high-speed lifts) enhance user experience while showcasing cutting-edge engineering.

4 **Four Seasons**	Floor-to-ceiling glazing on the north and south façades provides unparalleled views of the Arabian Gulf and the surrounding Manama skyline.	Dual-tower "H" silhouette: The 201.5-meter twin monoliths, connected by suspended floors, evoke a gateway metaphor, symbolising Bahrain's role as a regional connector. This form avoids literal cultural references but aligns with the nation's trade-centric history through its monumental presence.	The arrival via boats pulling in from the harbour enhances the user experience.	Two textured concrete piers that support a stack of 17 hotel floors at lower elevations and two restaurant and conferencing floors at the building's summit. Energy-efficient systems and thermal management in the glass curtain walls mitigate the Gulf's extreme climate.

Balancing Technology and Local Identity in High-rise Architecture: Scale Matters

The interplay between technology and local identity in high-rise buildings is a nuanced challenge that must be addressed on both the building and urban scale. (Figure 5) indicates a clear consensus among participants regarding avoiding direct replication of traditional architectural features in new high-rise projects. As articulated by respondent 6:

"It is important to emphasise that expressing local architectural identity in high-rise buildings should not rely solely on treating façades with superficial architectural and decorative elements or imitating façade elements from old heritage buildings. Rather, this identity must emanate from the building's correct architectural and functional design as an integrated unit."

Nevertheless, more respondents favoured a hybrid approach, blending traditional elements with modern materials and techniques. Approximately 30 % expressed a preference for a contemporary reinterpretation of cultural symbolism. As respondent 21 noted:

"Preserving local identity is extremely important. However, architecture needs to respond to contemporary times and modern technology, moving forward from a traditional to a more modern reinterpretation. Beit Quran in Bahrain is a good example, as well as several contemporary mosques."

Conversely, a minority argued against the necessity of maintaining local identity in new skyscrapers, emphasising the importance of distinguishing contemporary architecture from the past and highlighting sustainability as a key driver for innovation.

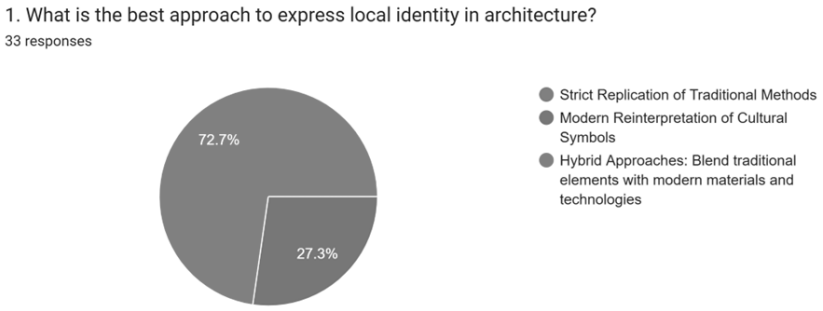

Figure 5. Participants' point of view on expressing local identity.

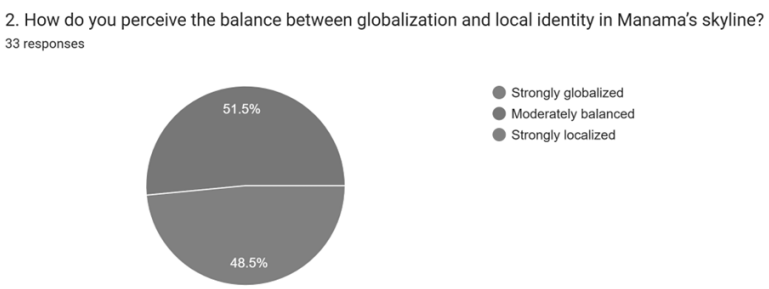

Figure 6. Respondents' perspective on the degree of balance between globalisation and local identity.

Moreover, regarding the current state of Manama's urban fabric, survey responses (figure 6) were nearly equally divided between those who perceived a strongly globalised skyline and those who recognised a more balanced or hybrid architectural character. One respondent observed:

"The skyline of Manama has fully converted to high-rise glazed buildings. The older buildings, which used to dominate the skyline of Manama, such as Bab Albahrain and the 70s construction building, are no more visible."

Another participant offered a more nuanced perspective:

"It is more of a mix between both, depending on the different areas of Manama, some areas are globalised in their architecture, while others are underdeveloped or a hybrid of old and new buildings."

These responses indicate an awareness of the gradual dominance of new developments over Manama's traditional skyline. However, some participants believe a degree of balance remains, contingent upon the specific area under consideration. Given the study's focus on high-rise buildings, it is noteworthy that over 60% of respondents felt the current façades are unlikely to reflect local identity, while 30% were neutral. Only 3% believed there is some degree of identity reflection. The subsequent case study analysis aims to address this issue in greater detail (Figure 7).

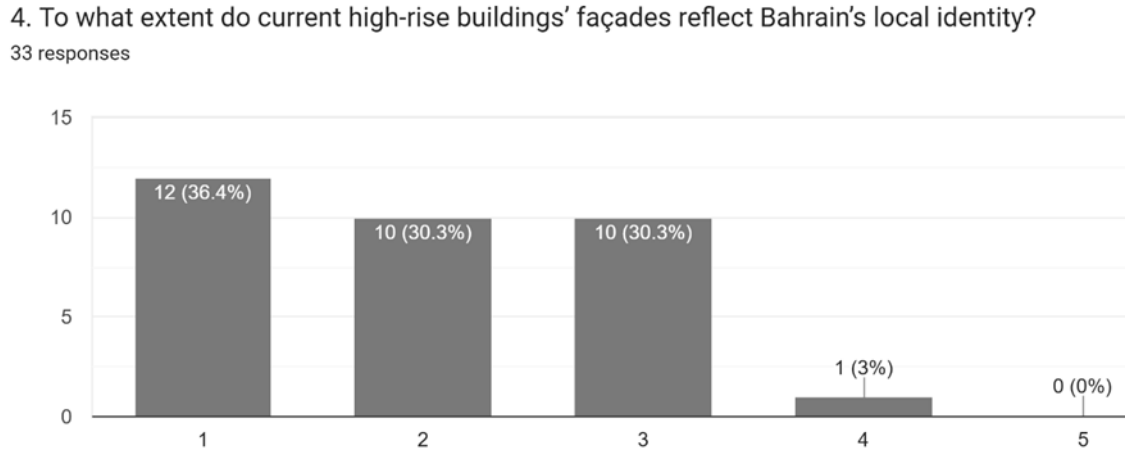

Figure 7. Survey Results.

Building Scale vs. Urban Scale

On the building scale, architects integrate advanced materials, structural systems, and innovative technologies to improve efficiency and safety while referencing traditional forms, materials, or motifs to maintain cultural resonance. At the urban scale, architects must consider broader factors, such as the impact of high-rise buildings on city skylines, urban density, and the relationship with historical urban fabrics. Compatibility between a high-rise building and its environment requires a holistic approach, considering land use, landscape integration, and urban nodes. This approach bridges architectural innovation with the continuity of local identity and urban character, fostering a harmonious blend of tradition and modernity. Thus, the balance should not be confined to a single scale; rather, it should be a multi-scalar dialogue, ensuring that technological advancements enhance both the individual building and its contribution to the broader urban context.

Technology as a Bridge: Achieving Balance

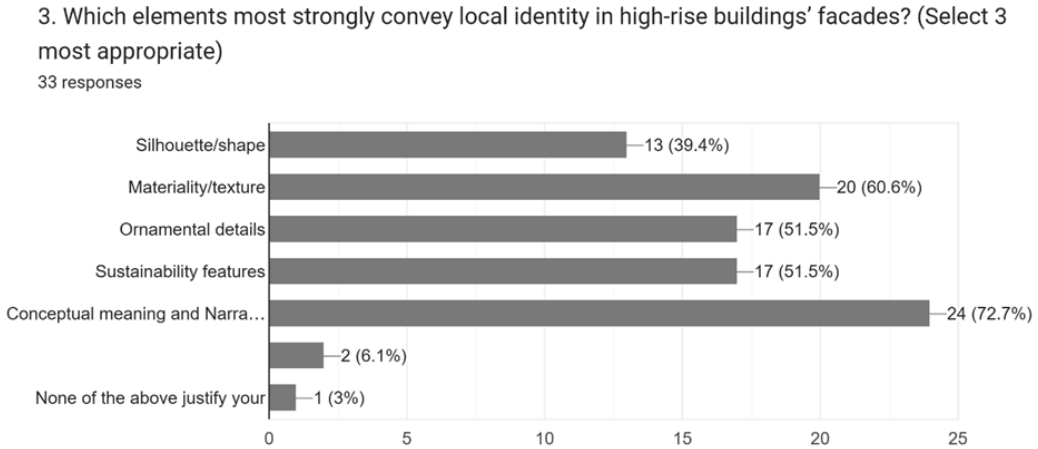

Figure 8. Respondents' perspectives on the best elements conveying local identity.

Participants were also asked to identify the parameters most strongly conveying local identity and the role of technology in shaping it. The majority agreed (Figure 8) that conceptual meaning and narratives effectively reflect identity in high-rise buildings, followed by materiality and texture, with ornamental details and sustainability features considered less influential compared to the previous parameters mentioned. One respondent commented:

"Conceptual meaning might be more adaptable to high-rise buildings. Other factors, such as shape and materiality, might be achievable to a certain extent in high-rise buildings, especially since the current approach is linked to fully glazed buildings. In cases where design approaches are not related to high rise, for example, having restrictions on height factors such as materiality and shape might convey the identity more powerfully."

This raises a critical question regarding the necessity of glass façades in high-rise design. Additionally, several participants emphasised that identity should be experienced through the buildings' functionality rather than superficial ornamentation.

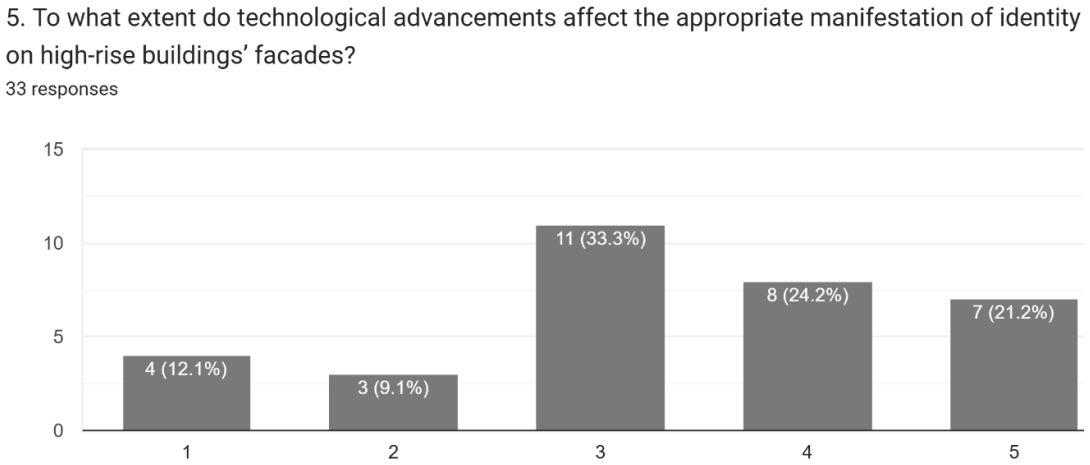

Figure 9. Respondents' views on the effects of technology on local identity Manifestations

While the majority acknowledge the effect of technology on the manifestation of identity (Figure 9), their justifications varied, with some viewing technology as supportive of identity and others as potentially detrimental to it. Architects highlighted the creative use of advanced tools and methodologies to express identity. For example, the use of parametric and dynamic façade designs in the UAE has improved energy efficiency and incorporated regional architectural heritage (Bande et al., 2022). Similarly, generative AI in façade design has created contextually relevant designs that reflect local identity (Jo et al., 2023). Machine learning helps decision-makers and designers select the optimal building facade architecture from multiple options, efficiently implementing suitable technical solutions. Additionally, it aids in assessing the sustainability of each alternative. In essence, machine learning is a valuable tool for enabling designers to develop sustainable solutions aligned with strategic authority goals (Elghonaimy & Sultan, 2024).

Technology plays a pivotal role in achieving a balance between tradition and innovation in high-rise architecture.

- Material Innovation: Advanced materials such as cross-laminated timber or high-performance composites allow for traditional aesthetics with modern performance, enabling architects to reinterpret local forms without sacrificing structural integrity or sustainability.
- Digital Design Tools: Building Information Modelling (BIM), parametric design, and virtual reality enable architects to visualise, simulate, and refine the integration of traditional elements with cutting-edge systems, ensuring harmony at both the building and urban scales.
- Sustainable Systems: Smart building technologies—such as energy-efficient HVAC, renewable energy integration, and water recycling—can seamlessly incorporate designs that reference traditional passive strategies, marrying heritage with high performance.
- Customisation and Prefabrication: Modern fabrication techniques enable the creation of bespoke façade elements that reflect local motifs, making it feasible to produce culturally resonant architecture at scale without incurring excessive cost or complexity.

In sum, technology should not be viewed as antithetical to tradition. Instead, it serves as a powerful enabler, allowing architects to reinterpret and revitalise local identities in high-rise buildings while meeting the demands of modern urban life.

Imposing local identity-building codes: Necessity and nuance

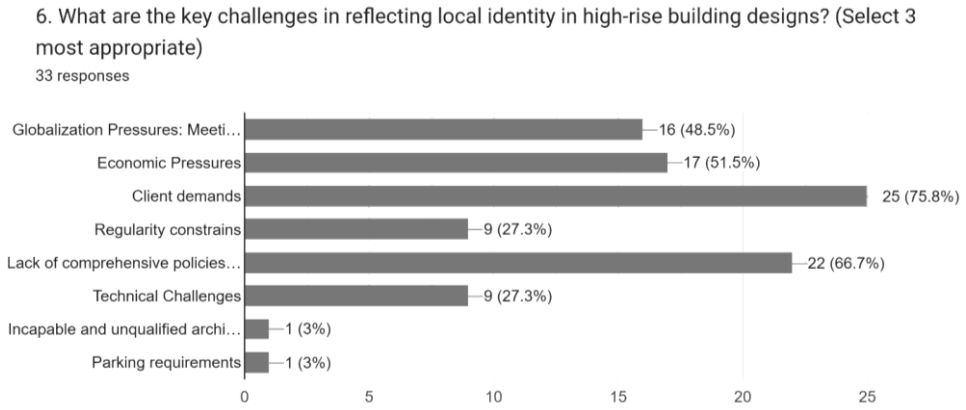

Figure 10. Participants' Responses regarding the challenges of representing local identity in building facades

The most challenging criteria for achieving local identity in high-rise buildings were client demands, lack of comprehensive policies, and economic pressures (Figure 10). The findings suggest that client-driven requirements could be better managed by implementing practical policies that guide the appropriate reflection of identity in new development.

The issue of implementing local identity through building regulations for high-rise structures is intricate. On one side, local identity codes can protect cultural heritage, prevent cultural homogenization, and cultivate a sense of belonging in rapidly globalising urban centres. Conversely, strict enforcement may hinder architectural innovation, restrict technological integration, and lead to superficial imitation rather than genuine expression. Architectural scholars contend that a deviation from tradition is never absolute; instead, reimagining tradition involves reworking and integrating it in a meaningful manner. Consequently, while some regulatory guidance is advantageous for preserving cultural continuity, building codes should possess sufficient flexibility to facilitate creative reinterpretation and technological progress, rather than mandating static replicas of historical forms. For instance, traditional built environments typically feature limited architectural forms that could inspire high-rise building design. Such environments are primarily characterised by low-rise architecture, thereby limiting their applicability to vertical construction. (Al-Kodmany & Ali, 2012)

For instance, the wind tower exemplifies a distinctive traditional architectural form that can be adapted into contemporary tall building designs. Nevertheless, several pertinent questions may emerge. What other forms of vertical vernacular architecture, apart from the wind tower, are present in Bahrain? To what extent can additional skyscrapers integrate the wind tower motif into their architecture? If every Bahraini skyscraper were to adopt this form, the city's aesthetic could suffer from a uniform and monotonous appearance. Consequently, incorporating traditional architectural forms into modern skyscrapers presents a formidable challenge. The complexity of the design remains ambiguous and may not appeal to lay observers, who lack interest in the underlying philosophical concepts or subtle metaphors that architects and critics can perceive.

Conclusions and Recommendations

To conclude, culture, identity, and architecture share a reciprocal and dynamic relationship. Architecture serves as a cultural identity reflector, an influencer, a repository of collective memory, and a driver for social cohesion. Integrating cultural identity into architectural practice is crucial for fostering a sense of place, continuity, and belonging in an increasingly globalised world. However, the ongoing proliferation of glass high-rise buildings, such as those in Manama, comes at the expense of local identity and environmental responsiveness. In parallel, glass façades reflect a global fascination with modernity, technological advancement, and economic progress; their widespread adoption, however, risks creating visually homogeneous skylines and buildings that are poorly adapted to local climates and cultural contexts.

This study emphasises the importance of incorporating local identity into high-rise design, not merely as a gesture to tradition, but as a vital approach for achieving sustainability, cultural continuity, and urban distinctiveness. Examining case studies and contemporary practices reveals that it is possible to harmonise innovative technologies and sustainable materials with culturally resonant design elements. Such an approach ensures that high-rise buildings contribute positively to the urban fabric, fostering a sense of place and belonging for current and future generations.

- **Create Incentives for Outstanding Local Designs**

To encourage architects and developers to prioritise local culture, sustainability, and eco-friendly practices, urban policymakers should establish clear incentives. These could include tax breaks, expedited permitting, or bonus floor

area ratios for projects that demonstrate a straightforward integration of regional identity and sustainable technologies. By rewarding excellence in design, cities can inspire a new generation of buildings that both honour heritage and address environmental challenges.

- **Assess and Celebrate Cultural Importance at the Ground Level**

Ground-level design is where buildings interact most with daily life and community identity. Planners should assess the cultural significance of façades and public spaces, ensuring that a meaningful portion of each project reflects local traditions, materials, and artistry. This approach strengthens sociocultural integrity and fosters a sense of belonging among residents.

- **Focus on Contextual Design: Rethink Glass Façades**

While glass façades have become synonymous with modern skyscrapers, their universal application often overlooks local climate, energy efficiency, and cultural context. Cities should carefully evaluate whether such designs are appropriate, especially in hot climates where glass can increase energy demands. Instead, encourage the use of adaptive façades, local materials, and passive design strategies that respond to both place and people.

- **Engage Communities Through Early Perception Surveys**

Meaningful urban development begins with listening. Developers and architects should conduct perception surveys at the outset of each project, engaging local communities, cultural authorities, and environmental experts. This participatory approach ensures that new buildings reflect regional values, history, and needs, resulting in urban projects that are more widely accepted and cherished.

- **Balance Modernity with Tradition**

Technological innovation and cultural sensitivity are not mutually exclusive; instead, they can coexist and complement each other. Encourage the integration of advanced systems—such as high-performance glazing, renewable energy, and innovative building technologies—while adapting them to local climates and customs. Avoid one-size-fits-all solutions in favour of tailored approaches that respect tradition and drive progress.

- **Promote Local Identity Through Policy and Regulation**

Urban policymakers play a crucial role in shaping city skylines. By enacting regulations and offering incentives that prioritise local identity and sustainability, cities can foster a diverse, resilient, and vibrant urban fabric. Zoning codes, design guidelines, and heritage overlays should all reflect a commitment to cultural continuity and environmental stewardship.

- **Support Multidisciplinary Research and Education**

The future of high-rise design lies in collaboration. Encourage research that bridges architecture, urban planning, sociology, and environmental science to discover effective ways of blending modernity with regional identity. Academic and professional programs should emphasise culturally sensitive, sustainable design principles, preparing the next generation of practitioners to lead with empathy and innovation.

- **Establish Professional Awards for Contextual Innovation**

Recognition inspires excellence. Launch national or regional awards—modelled after the Aga Khan Award for Architecture—that celebrate innovative high-rise projects rooted in the local context. These awards should highlight not only aesthetic achievement but also contributions to community, sustainability, and cultural continuity.

By following these recommendations, cities can ensure that future high-rise buildings transcend their roles as mere symbols of economic growth. Instead, they become lasting landmarks—celebrating local heritage, addressing environmental challenges, and enriching the daily lives of urban residents. In this way, the skyline becomes a tapestry of stories, values, and aspirations unique to each place.

Acknowledgement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interests

The author(s) declare(s) no conflict of interest.

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