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Rethinking Vertical Cities: The Influence of Public Perception on Design, Form, and Socio-Cultural Integration

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Abstract

This study examines the multiple determinants of public satisfaction with high-rise urban forms in Muscat, Oman, in the context of rapid urbanization and the need to protect and conserve culture. Based on a conceptual framework that included six latent variables—Cultural Harmony, Economic Benefit, Environmental Experience, Social Perception, Urban Connectivity, and Visual Appeal—data collected from city residents were analyzed using the quantitative technique of Partial Least Squares Structural Equation Modeling (PLS-SEM). The model results showed that all relationships were supported, with Urban Connectivity, Cultural Harmony, and Visual Appeal having the strongest effects on satisfaction. These findings indicate that public satisfaction with high-rise developments is influenced by the perceived integration of infrastructure, harmony with local architectural traditions, and coherently attractive views. Environmental Experience, Social Perception, and Economic Benefit had smaller, though still significant, effects, confirming the multidimensional nature of urban appraisal. This study therefore calls for a development approach that balances technical, environmental, cultural and tourism-oriented objectives. As such, this work contributes to the existing literature on urban and societal studies by examining a multifaceted model of urban satisfaction and providing beneficial recommendations to enhance the continuing debate on sustainable and contextual urbanism in the Gulf states.

Keywords: high-rise urban development; urban equity; social inclusion; urban connectivity; tourism

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1. Introduction

Urban development has become an increasingly significant concern for rapidly transforming cities worldwide, particularly in regions experiencing swift economic and population growth. Muscat, the capital city of Oman, has historically been characterized by low-rise, traditional architecture that reflects its rich cultural heritage and strong connections to Islamic and Arab design principles [1,2]. However, recent years have witnessed a pivotal shift with the initiation of large-scale development projects, most prominently the "Al Khuwair Muscat Downtown and Waterfront Development", which features the construction of high-rise buildings as a central component of Muscat's evolving urban landscape [3]. This transformation raises critical questions about the long-term impacts of high-rise developments on the city's sustainability.

A consistent yardstick is needed to judge whether Muscat's emerging skyline resonates with residents and prospective visitors alike. Public satisfaction is defined here as the composite cognitive-affective judgment residents make after weighing improvements in mobility, cultural resonance, streetscape aesthetics, environmental comfort, neighborly trust, and economic opportunity. People appraise these facets through interacting life domains—travel ease [4], cultural attachment [5], visual quality [6], thermal and environmental comfort [7], social cohesion [8], and economic opportunity [9]. Viewing satisfaction as a "net balance" of such domains aligns with quality-of-life theory [10].

The academic discourse surrounding high-rise developments underscores a broad spectrum of consequences, both beneficial and adverse, associated with vertical urban growth. Scholars have examined high-rise buildings in various global contexts, focusing on their environmental repercussions, such as contributions to the urban heat island effect, altered wind patterns, and escalated energy consumption [11,12]. At the same time, these structures have been linked to socio-psychological outcomes, including increased social isolation and the disruption of established community norms [13]. Economically, high-rise clusters are positioned as engines of competitiveness, attracting investment, stimulating employment and enhancing a city's global and increasingly touristic profile [14].

The rapid rise in high-rise developments has been extensively studied in relation to their environmental impacts, economic benefits, and aesthetic contributions across various global cities [15,16]. However, limited research has focused on understanding public perceptions of high-rise buildings within the unique cultural and environmental context of Muscat, where architectural identity and traditional urban fabric play a pivotal role in shaping resident satisfaction [17,18]. Existing studies often overlook how such developments intersect with local values, cultural heritage, and environmental challenges [19–21]. Thus, this study aims to fill that gap by analyzing how such buildings influence Muscat's visual, environmental, social, cultural, economic, and connectivity dimensions, with particular emphasis on public satisfaction, and by indicating how those same dimensions feed into the capital's ambition to position itself as a distinctive Gulf living and tourist hub.

The significance of this research lies in its potential to inform urban planning and policy-making processes at a crucial juncture in Muscat's development trajectory. The Omani government's "Vision 2040" initiative emphasizes sustainable urban growth, integrating modern architectural innovations with the preservation of cultural heritage and environmental stewardship [22]. Within this framework, understanding the empirical evidence related to high-rise buildings is vital for ensuring that future urban development aligns with both local values and international sustainability benchmarks.

Through this investigation, this paper contributes to the growing discourse on urban transformation in the Gulf region by foregrounding the lived experiences and perceptions of Muscat's residents, an often-overlooked dimension in top-down urban development models. Central to this inquiry is the following research question: How do high-rise developments influence the urban fabric of Muscat, and what are the prevailing public perceptions regarding their effects on the city's cultural identity and quality of life? This study seeks not only to document the evolving cityscape of Muscat but also to advocate for inclusive, culturally sensitive, and environmentally responsible urban growth strategies.

The structure of this paper is organized as follows: Section 2 conducts an extensive literature review, contextualizing the study within global and regional discourses on high-rise developments' socio-cultural, environmental, economic, and visual ramifications, with an emphasis on Gulf urbanism and Muscat's unique cultural–architectural identity. Section 3 delineates the methodology, presenting a multidimensional conceptual framework. Section 4 synthesizes empirical findings, elucidating the relative significance of various factors in shaping public satisfaction. Section 5 concludes with policy recommendations for sustainable urban planning in Muscat and identifies future research trajectories to advance context-sensitive urbanism in rapidly transforming Gulf cities.

2. Literature Review

2.1. Conceptualizing Public Satisfaction

Public satisfaction is widely understood as a multilayered cognitive-affective judgment in which residents weigh functional convenience, cultural resonance, aesthetic pleasure, environmental comfort, social experience and economic return [23–25]. Gauging this judgment is critical because it serves as an early-warning indicator of whether an urban intervention will gain long-term social license and remain politically and financially viable [26]. In dense, vertical settings, an efficient tower that ignores local identity can still leave people ambivalent, whereas a modest building that respects heritage may generate a strong attachment [27]. Cross-cultural evidence also shows the weighting of these domains shifts by context: access and environmental quality dominate responses in East Asian megacities [28], while cultural fit and skyline harmony lead in European heritage cores [29]. Gulf region scholarship, however, remains tilted toward macro metrics, GDP uplift, land value capture, and energy intensity rather than lived evaluations [30]. Where surveys exist. they often single out one factor, such as micro-climate comfort [31], masking the trade-offs residents juggle daily (e.g., accepting higher energy costs for cultural continuity).

2.2. Global and Regional Perspectives on High-Rise Development

Scholars have approached high-rise urbanism from three intertwined angles: (i) its economic rationale, celebrating land-use efficiency and agglomeration economies in cities such as New York, Tokyo and Dubai [32–34]; (ii) its social and psychological trade-offs, where vertical living can undermine community cohesion and heighten anonymity [35,36]; and (iii) its environmental footprint, including heat island amplification, altered wind–shade regimes and elevated energy demand [37,38]. Balancing these factors becomes even more complex when modern towers intersect with deep-seated cultural identities, an issue flagged in Middle Eastern contexts [39,40]. Within the GCC, case studies of Dubai, Doha and Riyadh document both the symbolic power and the ecological/social drawbacks of rapid verticalization [41,42], yet Muscat has received scant empirical attention beyond analyses of its low-rise vernacular fabric [43]. Moreover, most prior work privileges macro-level metrics over multidimensional public perceptions, leaving unanswered how residents simultaneously weigh cultural resonance, environmental comfort, visual coherence and functional performance [44,45].

2.3. Regional Context: Gulf Urbanization and Muscat's Pivot to Height

Over the last two decades, Gulf capitals have pursued aggressive skyline projects as symbols of economic diversification [46]. Dubai's "build-tall" model has been widely documented, but second-tier cities such as Doha and now Muscat are also embracing height, albeit at differing speeds and with stronger regulatory references to heritage [47,48]. In Oman, height limits remained modest until the late 2010s, when liberalized zoning in Airport Heights and Al-Khuwair triggered a wave of 20- to 35-storey proposals [49,50]. These projects have sparked debate about walkability [51], skyline integrity [52], tourism and cultural space [53], issues that directly inform residents' satisfaction with the new vertical landscape. As Muscat positions itself to attract more regional and international tourists, the visual identity and spatial coherence of these towers become increasingly important [54]. Tourism-oriented development strategies are now intertwined with high-rise proposals, placing greater pressure on urban planners to balance spectacle with authenticity [55].

2.4. Determinants of Public Satisfaction in the Built Environment

A growing body of research underscores the importance of integrating resident perspectives when assessing the success of high-rise developments [56,57]. Public satisfaction emerges as a multidimensional construct shaped by diverse factors spanning economic, environmental, cultural, social, visual, and mobility domains [58,59]. Table 1 synthesizes notable studies from various global contexts, capturing both the thematic focus and major empirical findings that inform these dimensions.

Table 1. Summary of key studies on high-rise developments: cross-country perspectives.

Factors/Dimensions	Country	Reference
Economics of vertical urbanism	UK/AUS	[60]
Economic equity	Australia	[61]
Environmental heat island effects	Malaysia	[62]
Environmental design efficiency	Turkey	[63]
Micro-environmental impacts	Pakistan	[64]
Cultural identity	Egypt	[65]
Cultural acceptance	Malaysia	[66]
Social perception	Australia	[67]
Social cohesion	USA	[68]
Urban connectivity/TOD	Global review	[69]
Street-level integration	Denmark/Global	[70]
Mobility impacts	Australia	[71]
Visual aesthetics	USA	[72]
Visual quality governance	UK	[73]
Skyline management	Qatar	[74]

Cultural harmony gauges how well new buildings respect a city's architectural and historical identity [75,76]. Preserving that continuity sustains residents' sense of place [77] and is a priority heightened in Muscat's Islamic urban context [78]. High-rise towers are often faulted for disrupting traditional skylines and vernacular language [79], yet recent work shows that mashrabiya screens and geometric motifs can be integrated to maintain continuity [65]. Critics, however, caution that such gestures risk superficial mimicry if not thoughtfully applied [80]. Accordingly, cultural harmony remains a decisive measure for judging high-rise success in heritage-sensitive settings.

The economic benefit dimension gauges how high-rise projects drive local growth through jobs, investment and market activation [81,82]. Vertical construction is often promoted as an engine of urban revitalization: it clusters commercial uses, lifts real-estate values and boosts city branding [83], as Toronto's skyline famously illustrates. Yet scholars caution that such gains can be uneven; speculative towers may inflate prices and widen socio-economic gaps [84]. For Muscat, where Vision 2040 prioritizes broad-based diversification [85], the key question is whether new high-rises distribute benefits beyond elite enclaves.

Environmental experience captures residents' judgements of thermal comfort, air quality, noise and greenery around high-rise schemes [44,86]. While vertical buildings can curb sprawl and protect fringe habitats [86], they often intensify heat island loads, wind turbulence and overshadowing at the street level [87,88], effects magnified in the Gulf's extreme climate [89]. Bioclimatic tactics such as optimal orientation, deep shading and integrated vegetation are increasingly advocated to counter these impacts [90], yet systematic evidence of how Muscat's residents perceive such environmental shifts remains sparse.

Social perception considers how tall buildings affect neighborly interaction, cohesion and perceived livability [35,67]. Classic work by Gifford [91] links high-rise living to social isolation, weaker local ties and higher stress, patterns echoed in later studies showing lower community-life satisfaction than in low-rise areas. Yet evidence also shows that towers with well-designed communal terraces, atria or sky gardens can restore interaction and raise the quality of life [92,93]. Outcomes therefore hinge on context—cultural expectations, design quality and management. Given Muscat's strong family networks and emphasis on social cohesion [94], probing residents' social perceptions is essential to ensure vertical growth supports, rather than erodes, core social values.

Urban connectivity gauges how well a high-rise scheme links residents to transport, services and everyday amenities [69,95]. Vertical projects thrive only when woven into supportive infrastructure; without it, they become isolated enclaves that worsen traffic and reduce walkability [96]. Transit-oriented development is therefore promoted as the preferred delivery mechanism, marrying dense towers with robust public transport and pedestrian networks [97]. Muscat's heavy car dependence and limited transit make this dimension critical, yet few studies have measured how residents experience connectivity in the city's new high-rise zones.

Visual appeal captures how residents judge the skyline composition, architectural quality and contextual harmony of tall buildings [98]. Aesthetics strongly influence public acceptance: iconic towers can evoke civic pride, whereas poorly resolved façades are dismissed as visual clutter [99]. Critics warn that "statement architecture" risks overwhelming historic fabrics if it ignores contextual cues [80]. This tension is acute in Muscat, where long-standing height caps sought to protect visual harmony [2]; the city's new high-rise wave therefore faces close public scrutiny over aesthetic integration.

3. Theoretical Model

3.1. Theoretical Foundation and Research Gaps

In developing our conceptual framework, we weave together three complementary strands of urban study theory. Place attachment theory suggests that an urban form aligned with local culture and positive social perceptions fosters stronger emotional bonds between residents and place [27]. Environmental behavior models, particularly the Stimulus–Organism–Response paradigm, argue that objective design qualities such as urban connectivity, visual appeal and environmental experience trigger cognitive appraisals that ultimately shape satisfaction [100,101].

Although prior studies have examined each dimension in isolation—showing, for example, that cultural alignment deepens place attachment [78], economic gains motivate endorsement [83], environmental quality underpins livability [90], social cohesion sustains neighborhood vitality [85], urban connectivity enhances accessibility [102], and visual appeal engenders pride of place [73]—there is little empirical evidence of their combined influence within Muscat's rapidly evolving skyline.

3.2. Conceptual Framework and Hypotheses

Guided by this synthesis, we posit six direct paths (H1–H6) from the latent constructs to public satisfaction to high-rise development (SHD). Figure 1 maps these hypotheses, providing the analytical blueprint for the PLS-SEM tests that follow.

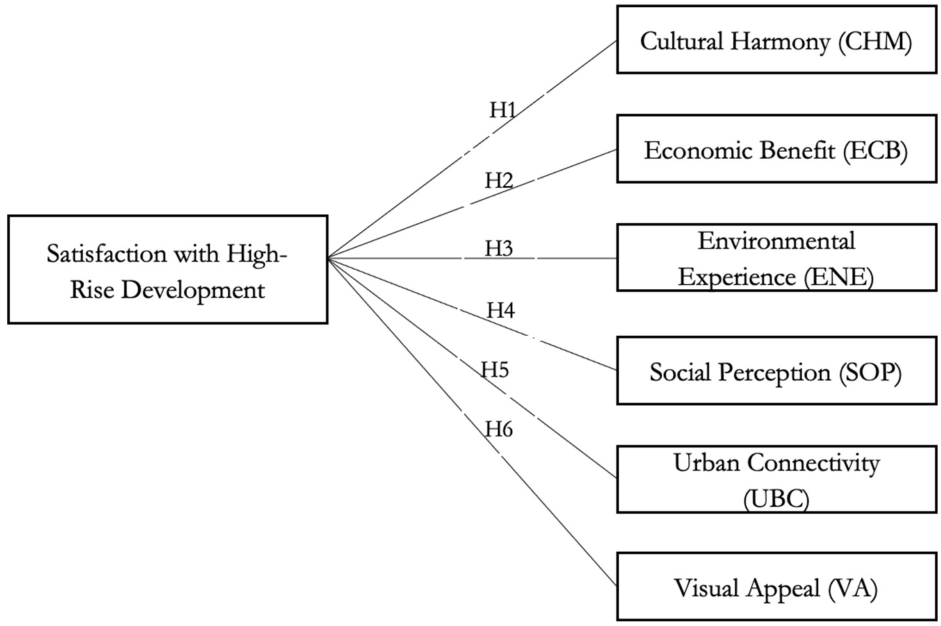

Figure 1. Conceptual framework linking built environment attributes to public satisfaction.

H1. *Cultural harmony significantly impacts satisfaction with high-rise development.*

H2. *Economic benefits significantly impact satisfaction with high-rise development.*

H3. *Environmental experience significantly impacts satisfaction with high-rise development.*

H4. *Social perception significantly impacts satisfaction with high-rise development.*

H5. *Urban connectivity significantly impacts satisfaction with high-rise development.*

H6. *Visual appeal significantly impacts satisfaction with high-rise development.*

These operationalisations capture the multifaceted perceptions of Muscat residents. The model includes eighteen (18) indicator variables, organized into six categories representing exogenous latent variables. This structure allows for a detailed examination of the relationships between manifest variables and their respective latent constructs. For example, Cultural Harmony (CHM1–CHM3), Economic Benefit (ECB1–ECB3), and Environmental Experience (ENE1–ENE3) are each represented by three indicators. Similarly, Social Perception (SOP1–SOP3), Urban Connectivity (UBC1–UBC3), and Visual Appeal (VA1–VA3) capture perceptions through their associated items. The conceptual framework illustrates the relationships between the manifest indicators and their exogenous latent variables (Figure 1).

3.3. Why Smart PLS-SEM?

Smart PLS-SEM was chosen for four inter-related reasons. First, the study's overriding goal is predictive: we seek to forecast public satisfaction and pinpoint the most influential levers for planners, a task for which variance-based SEM is better suited than covariance-based approaches [103]. Second, our dataset (N = 301) comfortably meets PLS's "10-times rule" threshold—ten times the largest number of arrows pointing at a construct ($10 \times 6 = 60$)—yet Shapiro–Wilk tests reveal significant non-normality on several indicators ($p < 0.05$), another condition that favors PLS-SEM. Third, the conceptual framework is fairly intricate, comprising six latent constructs and nineteen reflective indicators; SmartPLS can estimate such models with fewer identification constraints than CB-SEM. Finally, SmartPLS includes an integrated bootstrapping routine (5000 resamples), allowing us to obtain robust path coefficient significance levels without resorting to external scripting.

3.4. Analytical Procedure

The analysis followed a two-stage protocol. Measurement—model assessment involved deleting low-loading items, verifying internal consistency (Cronbach's α, composite reliability), confirming convergent validity (average variance extracted) and establishing discriminant validity (Fornell–Larcker and HTMT). Structural—model evaluation then checked for multicollinearity (inner-VIF), tested path significance and effect sizes via bootstrapping, gauged predictive power with R^2 and Stone–Geisser Q^2, and inspected overall fit through the SRMR index. All diagnostics satisfied contemporary PLS-SEM benchmarks; detailed statistics are reported in the Materials and Methods and Results Sections.

4. Materials and Methods

4.1. Study Area

This study focuses on Muscat, the capital city of the Sultanate of Oman, situated along the northeastern coast of the Arabian Peninsula. Muscat's population of approximately 1.4 million [104] is a heterogeneous mix of Omani nationals and expatriates, contributing to a diverse social fabric. Topographically, the city is shaped by steep mountainous terrain, narrow coastal plains, and intermittent wadis, which have strongly influenced its linear development pattern along the coast [105]. Figure 2 positions the Muscat Capital Area on Oman's northern seaboard and reveals the narrow coastal "corridor" within which every subsequent wave of construction has been forced to fit. The inset highlights Muscat's administrative extent relative to the Sultanate's eleven governorates, while the main panel shows how the settlement ribbon runs uninterrupted from Muttrah to Seeb, hemmed in by the Gulf to the north and the Hajar escarpment to the south. Primary east–west arterials and a web of secondary radials underscore the road-dependent mobility spine, and the wadis that dissect the shelf explain both the jagged urban edge and the difficulty of creating continuous public transport alignments.

Figure 3's orthophoto sharpens the reading of Muscat's spatial contrasts. Tight, organically arranged lanes still define the heritage cores of Old Muscat and Muttrah, while large-parcel villa grids blanket As Seeb and Bawshar in a uniform, car-oriented mesh. Military compounds and the airport reserve pierce this coastal ribbon, leaving leap-frog voids that break pedestrian continuity and channel most trips onto the arterial network, patterns echoed in the study's Urban Connectivity results. Against this low-rise backdrop, isolated clusters of 20- to 35-storey towers are now emerging, signaling Muscat's cautious pivot toward vertical urbanism.

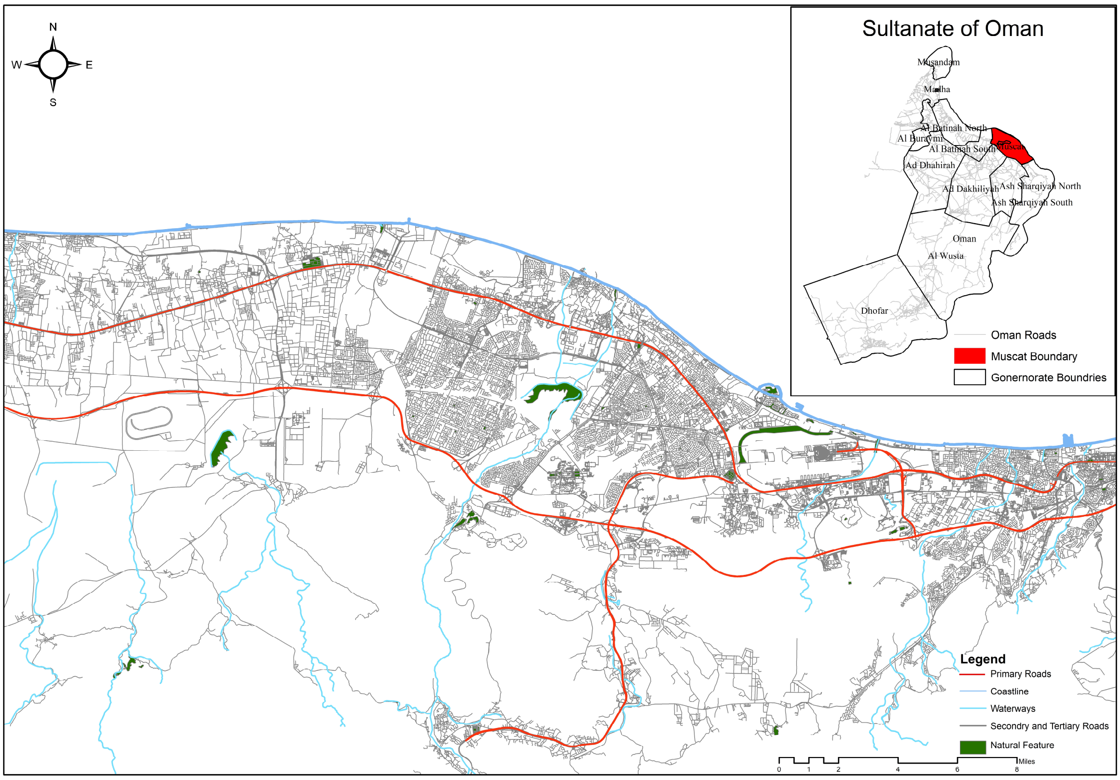

Figure 2. A geographic overview of the study area: Muscat, Oman, highlighting key urban zones, transportation networks, and administrative boundaries.

Figure 3. True-color orthophoto of the Muscat Capital Area with wilayat limits and major topographic breaks. Source: Scholz and Langer [106].

Historical perspective shows how today's morphology evolved (Figure 4). Until the early-1970s oil boom, Old Muscat and Muttrah were compact, walled harbor towns. Post-1970 land grant policies triggered a ribbon of suburban villas. Plot sizes grew from 120–150 m^2 to over 600 m^2 and organic clusters gave way to orthogonal grids. These shifts embedded low-density, car-oriented living patterns that later high-rise proposals now seek to counter by introducing vertical density.

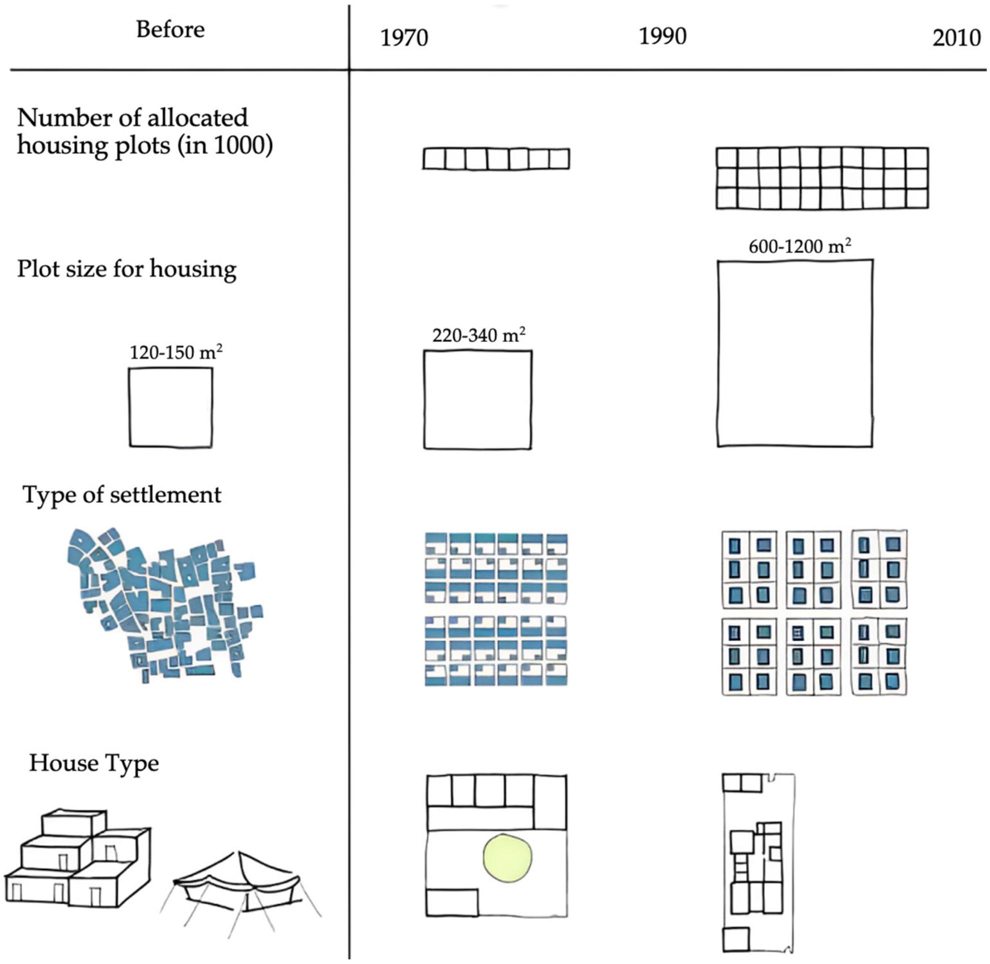

Figure 4. Evolution of housing typologies in Oman (pre-1970 to 2010), showing shifts in plot size, settlement form, house type, and household size. Source: Adapted from Montague et al. [107].

4.2. Data Collection

Measurements for the dimensions of high-rise development perception were adapted from established scales and refined based on a thorough literature review and focus group discussions with local residents. To develop a comprehensive and context-specific set of measurement items, prior validated studies in urban satisfaction and environmental psychology were reviewed, e.g., [74,91], and focus groups provided local contextual insights. As a result, 18 items were finalized across the 6 dimensions of high-rise development perception: Cultural Harmony (3 items), Economic Benefit (3 items), Environmental Experience (3 items), Social Perception (3 items), Urban Connectivity (3 items), and Visual Appeal (3 items). All items were carefully reworded to reflect the local urban context and cultural nuances of Muscat. A 5-point Likert scale ranging from 1 (“Strongly Disagree”) to 4 (“Strongly Agree”) was used to measure perceptions. The questionnaire draft was reviewed by academic experts to enhance clarity and contextual relevance, and minor revisions were made to improve readability and the precision of wording. This process ensured that the questionnaire statements were both comprehensible and credible for respondents. A detailed description of the manifest variables and their corresponding latent constructs is provided in Table 2.

Table 2. Measurement items and groupings for constructs related to high-rise developments in Muscat.

Group	Item	Description of Item
Demographic Information	Age	What is your age group?
	Gender	What is your gender?
	Education	What is your highest level of education?
	Occupation	What is your current occupation?
	Income	What is your monthly household income in OMR?
	Stay Duration	How long have you lived in Muscat?
Cultural Harmony (CHM)	CHM1	I believe that high-rise buildings in Muscat blend traditional architectural elements (arches & motifs) with modern design.
	CHM2	I feel that high-rise developments help preserve clear views of Muscat's historic landmarks (forts and surrounding mountains).
	CHM3	I think the public spaces inside high-rise buildings reflect Omani cultural practices, for example by providing communal majlis areas.
Economic Benefit (ECB)	ECB1	I believe high-rise buildings make a significant contribution to Muscat's economic and tourism growth.
	ECB2	I think high-rise projects create job opportunities and boost local businesses in Muscat.
	ECB3	I find the locations of Muscat's high-rise buildings to be easily accessible.
Environmental Experience (ENE)	ENE1	I perceive that energy consumption, such as air-conditioning and water use, is high in Muscat's high-rise buildings.
	ENE2	I believe that constructing high-rise buildings in Muscat should prioritise eco-friendly materials.
	ENE3	I feel that high-rise buildings negatively affect Muscat's local climate by disrupting wind patterns and increasing temperatures.
Social Perception (SOP)	SOP1	I think high-rise developments undermine traditional values and customary living norms in Muscat.
	SOP2	I believe high-rise developments should integrate more traditional cultural elements.
	SOP3	I feel that Muscat's high-rise buildings offer sufficient communal spaces for social interaction.
Urban Connectivity (UBC)	UBC1	I find that high-rise buildings in Muscat are well connected to public transportation, such as buses and any future metro services.
	UBC2	I think pedestrian-friendly features like shaded walkways and parks are available around most high-rise developments in Muscat.
	UBC3	I believe high-rise buildings give me convenient access to essential services such as schools, hospitals, and markets.
Visual Appeal (VA)	VA1	I feel that the presence of high-rise buildings enhances Muscat's overall visual appeal.
	VA2	I find the architectural design, colours, and materials used in Muscat's high-rise buildings aesthetically pleasing.
	VA3	I believe future high-rise projects in Muscat should adopt more modern and innovative designs.

4.3. Sample Adequacy and Preliminary Data Diagnostics

A total of 309 questionnaires were returned, and after discarding incomplete responses, 300 were deemed valid and suitable for further analysis. This sample size exceeds the required minimum, which is calculated based on a 99% confidence level, a standard deviation of 0.5, and a ±1% margin of error. While the widely accepted guideline suggests a minimum of 10 responses per indicator, Kline [108] emphasized that the adequacy of sample size in structural equation modeling (SEM) also depends on model complexity and the number of parameters estimated. Given that this model includes 6 latent variables and 18 indicator variables, amounting to approximately 48 estimated parameters, Kline's (2016) guideline recommends a minimum sample size of around 480 cases for strong estimation. However, for models of moderate complexity, a sample size of 200–300 is generally considered sufficient [108]. Therefore, the final sample of 300 respondents provides adequate statistical power and meets the recommended thresholds for SEM.

To assess the suitability of the dataset for factor analysis, two preliminary tests were conducted: the Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity (Table 3). The KMO test evaluates whether the data are suitable for factor analysis by measuring the proportion of variance among variables that might be common variance. A KMO value above 0.60 is considered acceptable [109], and in this study, a KMO value of 0.690 was obtained, indicating that the sample is fit for factor analysis. Bartlett's Test of Sphericity assesses whether the correlation matrix significantly differs from an identity matrix, implying that the variables are sufficiently correlated to justify factor analysis. The test result was highly significant (χ^2 = 2161.53, df = 153, $p < 0.001$), affirming that the correlation matrix was not an identity matrix and that the data were suitable for extraction. Both tests together validate the appropriateness of the dataset for exploratory factor analysis.

Table 3. KMO and Bartlett's Test of Sampling Adequacy.

KMO and Bartlett's Test		
Kaiser–Meyer–Olkin Measure of Sampling Adequacy		0.690
Bartlett's Test of Sphericity	Approx. Chi-Square	2161.534
	df	153
	Sig.	<0.001

Furthermore, communalities were examined to determine the extent to which each item's variance was explained by the factor solution. All eighteen items demonstrated extraction communalities between 0.70 and 0.82, indicating that at least 70% of each item's variance was accounted for by the model, well above the conventional 0.40 cut-off [110]. This reflects strong shared variance across constructs. In terms of factor extraction, both the eigenvalue > 1 criterion and the scree plot confirmed the presence of six distinct factors. Together, these six components explained 75.1% of the total variance, which represents excellent explanatory power for social science data [111].

Additionally, to assess data normality, skewness and kurtosis statistics were computed for each item. These tests examine the symmetry (skewness) and peakedness (kurtosis) of the data distribution. All items showed skewness values between −1.25 and +0.71 and kurtosis values between −0.89 and +0.23, well within the acceptable range of −2 to +2 [112], indicating that the data approximates a normal distribution and is suitable for SEM.

Common method bias (CMB) was evaluated using Harman's Single-Factor Test, a widely used diagnostic tool that tests whether a single factor accounts for the majority of the variance in the dataset, which would indicate potential bias [113]. In this study, unrotated exploratory factor analysis revealed that the first factor explained only 15.14% of the total variance, well below the 50% threshold suggested by Podsakoff et al. [114]. This result indicates that common method bias is unlikely to pose a significant threat to the validity of the findings. Taken together, these diagnostic tests confirm that the dataset is reliable and suitable for further multivariate statistical analysis.

4.4. Application of Partial Least Squares Structural Equation Modeling (PLS-SEM)

This study employed a structural equation modeling (SEM) approach to investigate the complex interrelationships among the six latent constructs: Cultural Harmony (CHM), Economic Benefit (ECB), Environmental Experience (ENE), Social Perception (SOP), Urban Connectivity (UBC), and Visual Appeal (VA). Specifically, the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique was applied, which is widely recognized as a second-generation multivariate data analysis method suitable for exploratory research and complex models [111,115]. PLS-SEM is particularly advantageous when research focuses on prediction and theory development, rather than strict model fit, and when data distributions deviate from normality [116], conditions met in the present study.

SmartPLS 4.0 software was utilized to operationalize the model, offering advanced capabilities for both measurement and structural model assessment. The technique provided a comprehensive visualization of latent constructs and their corresponding indicator variables, facilitating the evaluation of both direct and indirect effects among variables. Figure 5 presents the PLS-SEM structural model. The six latent constructs jointly explain 28.9% of the variance in Satisfaction with High-Rise Development (SHD, R^2 = 0.289). Urban Connectivity exerts the largest effect (β = 0.302), followed by Cultural Harmony (0.254), Visual Appeal (0.230), Environmental Experience (0.209) and Social Perception (0.203); Economic Benefit, while positive, is comparatively modest (0.127). A detailed discussion of the model appears in the Results Section (Section 5).

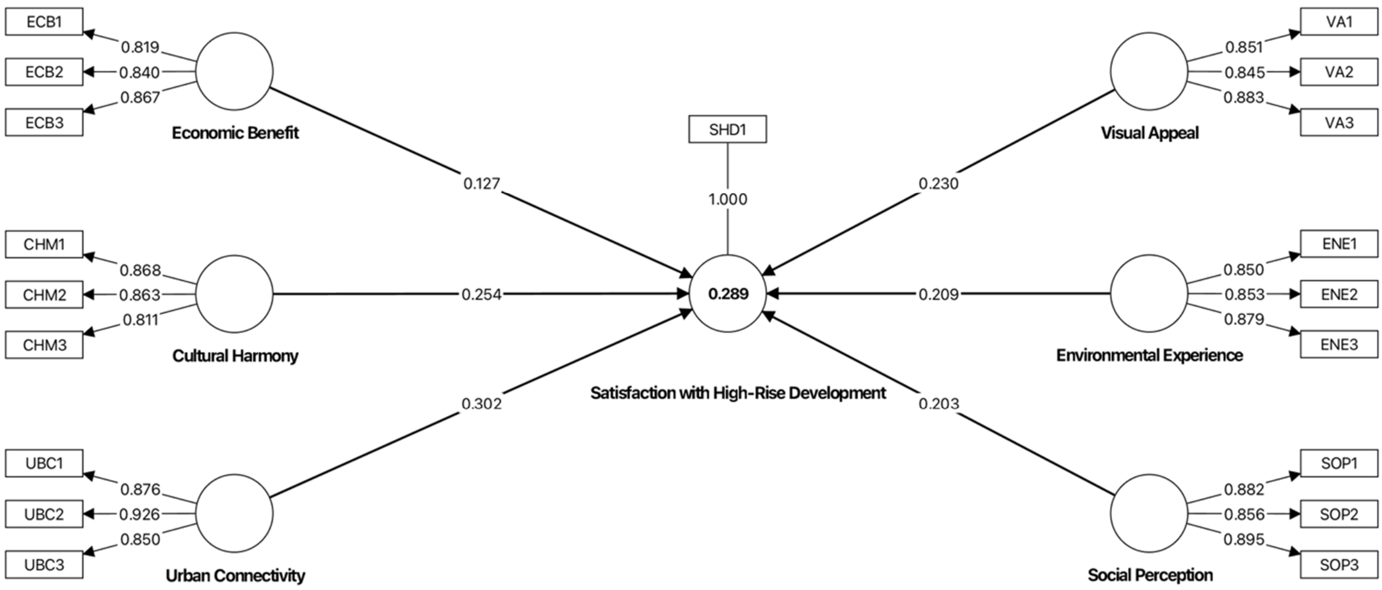

Figure 5. The development of the PLS-SEM structural equation model.

5. Results

5.1. Distribution of Socio-Economic Demographics (SEDs)

The sample (N = 300) is predominantly composed of middle-aged adults, with the 36–45 year cohort representing the largest share at 26.7%, followed by those over 65 years (19.3%), 26–35 years (17.0%), and 15–25 years (15.0%), while smaller proportions fall within the 46–55 and 56–65 year brackets (10.7% and 11.3%, respectively), highlighting a concentration of working-age adults alongside a substantial senior segment (Figure 6). Retirees form the largest occupational group (36.7%), followed by private (18.0%) and government (16.0%) employees, while students, the unemployed, and businessmen account for smaller proportions, suggesting that many respondents are either out of the workforce or engaged in structured employment. Income levels are concentrated in the 300–600 OMR range (58.0%), with 24.0% earning below 300 OMR and only 3.7% above 900 OMR, indicating modest financial capacity among the majority (Figure 7). Women slightly outnumber men (55.7% vs. 44.3%), and education levels are mostly mid-tier, with 41.0% having completed secondary education and 25.0% intermediate; just 13.3% hold graduate or postgraduate qualifications, while 11.0% have no formal education, pointing to a largely moderately educated population (Figure 8). Residential stability is mixed, with 28.3% of respondents having lived at their current address for 6–10 years, 24.3% for less than 1 year, 24.0% for more than 10 years, and 23.3% for 1–5 years, suggesting a balance between long-term residents and newer arrivals that can inform tailored engagement strategies.

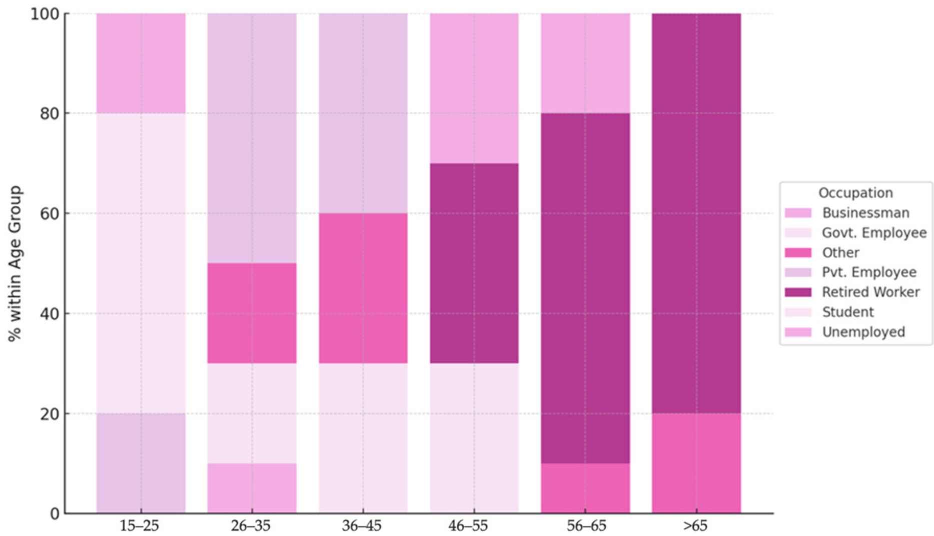

Figure 6. Occupation distribution by age group.

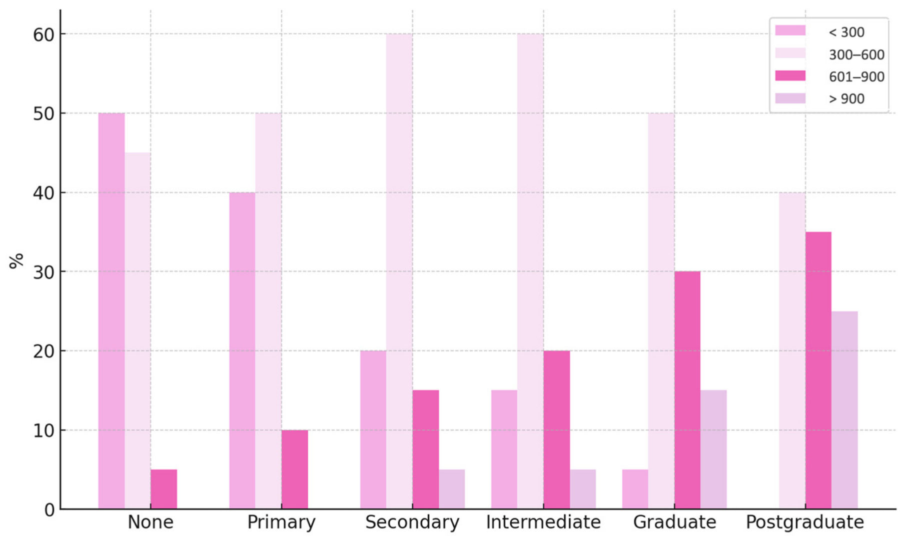

Figure 7. Income distribution by education level.

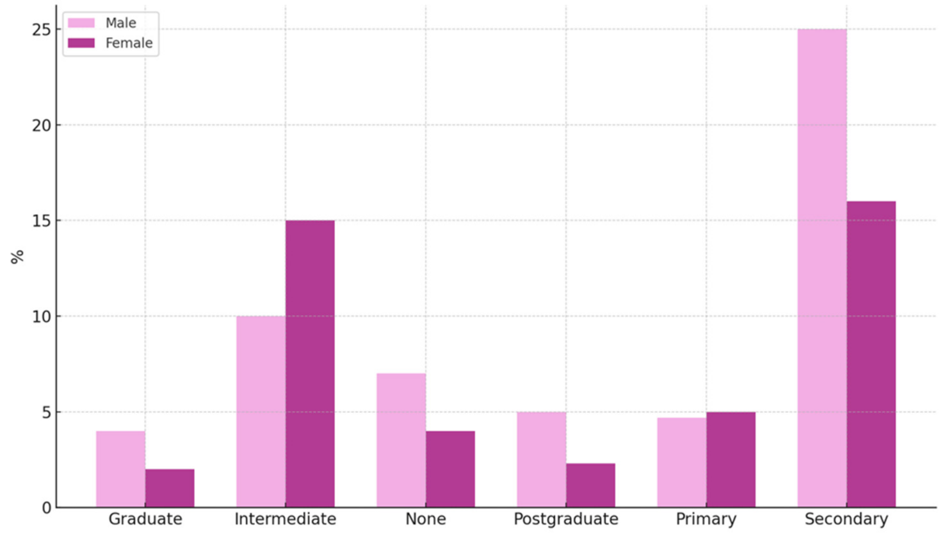

Figure 8. Gender distribution across education levels.

5.2. Measurement Model Evaluation

Data analysis was conducted using SmartPLS to simulate the conceptual model and examine the strength and significance of each latent construct influencing satisfaction with high-rise development. A two-step procedure was employed: (1) an evaluation of the measurement model to verify the reliability and validity of constructs and (2) an assessment of the structural model to estimate path coefficients and test the hypothesized relationships.

The adequacy of the structural equation model was confirmed through the R-square values, which indicate the explanatory power of the model. To ensure the robustness and reliability of the latent constructs, a comprehensive evaluation of the conceptual model was performed within SmartPLS. This assessment comprised five key steps:

- Convergent Validity and Individual Item Reliability.
- Discriminant Validity.
- Heterotrait–Monotrait Ratio of Correlations.
- Structural Model Assessment.
- Overall Model Fit.

5.2.1. Convergent Validity and Individual Item Reliability

The model's coherence was checked by examining convergent validity and item reliability (see Table 4). Convergent validity shows whether all indicators tap into the same latent construct; strong results here confirm that the constructs are being measured accurately and meaningfully.

Three metrics were used to test indicator quality—standardized loadings, Average Variance Extracted (AVE), and Composite Reliability (CR). Every item loaded strongly on its factor (0.811–0.926), above the 0.70 benchmark [111], confirming high individual reliability; examples include UBC2 = 0.926, SOP3 = 0.895, and ENE3 = 0.879. These results show that each indicator reliably represents its latent construct and that items consistently capture their intended dimensions.

The AVE test was further applied to determine the proportion of variance captured by each latent variable from its respective manifest variables. In line with the established threshold of 0.50 proposed by Fornell and Larcker [117], all constructs achieved AVE values ranging from 0.710 to 0.783, far exceeding the minimum requirement. This indicates that each latent variable successfully captured over 70% of the variance in its indicators, reinforcing the strength of convergent validity.

Table 4. Measurement model results showing factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR) for each construct and its associated items.

Constructs	Items	Loadings	AVE	CR
Cultural Harmony	CHM1	0.868	0.718	0.884
	CHM2	0.863		
	CHM3	0.811		
Economic Benefit	ECB1	0.819	0.710	0.880
	ECB2	0.840		
	ECB3	0.867		
Environmental Experience	ENE1	0.850	0.741	0.896
	ENE2	0.853		
	ENE3	0.879		
Social Perception	SOP1	0.882	0.770	0.909
	SOP2	0.856		
	SOP3	0.895		
Urban Connectivity	UBC1	0.876	0.783	0.915
	UBC2	0.926		
	UBC3	0.850		
Visual Appeal	VA1	0.851	0.739	0.895
	VA2	0.845		
	VA3	0.883		

In addition, Composite Reliability (CR) confirmed strong internal consistency: every construct scored 0.880–0.915, well above the 0.70 benchmark. These high values show the indicators reliably represent their latent variables. CR, which incorporates actual indicator loadings, is preferred over Cronbach's alpha, an advantage given the highly standardized items in this study.

An iterative review was performed to ensure that no indicators fell below acceptable thresholds. All indicators met the loading threshold (>0.70), so none were removed. Since no items fell in the 0.40–0.70 range that might warrant deletion, the full set was retained. Together with strong AVE, CR, and cross-loading results, this confirms the model's validity and reliability.

5.2.2. Discriminant Validity: Fornell–Larcker Criterion and Cross-Loadings

Discriminant validity is a critical component of measurement model evaluation, ensuring that each latent construct captures a unique concept distinct from others in the model. Following the assessment of convergent validity and individual item reliability, the discriminant validity of the latent variables was evaluated through two primary methods: the Fornell–Larcker criterion and cross-loadings. As defined by Fornell and Larcker [117], the square root of the Average Variance Extracted (AVE) for each construct (diagonal values in the table) must be greater than the construct's correlations with all other constructs (off-diagonal values). This test verifies that constructs share more variance with their respective indicators than with other constructs, thus establishing conceptual distinctiveness.

The Fornell–Larcker results demonstrate that Cultural Harmony (CHM) had a square root of AVE of 0.847, exceeding all its inter-construct correlations, which ranged from −0.068 to 0.075. Economic Benefit (ECB) showed a square root of 0.843, well above its highest correlation of 0.072, while Environmental Experience (ENE) posted a square root of 0.861, again surpassing its highest correlation of 0.075. Similarly, Social Perception (SOP) had a square root of AVE of 0.877, Urban Connectivity (UBC) reported 0.885, and Visual Appeal (VA) showed 0.860, all comfortably higher than their respective inter-construct correlations. This consistent pattern across all constructs satisfies the Fornell–Larcker criterion, reinforcing the empirical distinctiveness of each construct in measuring its intended concept.

To supplement this, discriminant validity was also assessed using the cross-loading criterion, which stipulates that each manifest variable should exhibit a higher correlation with its latent construct than with any other construct in the model [118]. Table 5 presents the cross-loadings, showing that all manifest variables had their highest loading on their corresponding constructs, with negligible loadings on others. For example, the items for Urban Connectivity (UBC1, UBC2, and UBC3) all showed strong loadings (e.g., 0.876, 0.926, 0.850) on the Urban Connectivity construct and much lower cross-loadings on other constructs. This pattern was consistent across all constructs, such as Social Perception and Environmental Experience, further confirming that each set of items accurately reflects its designated construct.

Table 5. Measurement of Fornell–Larker criterion for discriminant validity.

	1	2	3	4	5	6
CHM	**0.847**					
ECB	0.072	**0.843**				
ENE	0.075	0.025	**0.861**			
SOP	0.002	0.070	−0.078	**0.877**		
UBC	−0.068	−0.036	−0.066	0.006	**0.885**	
VA	0.008	0.004	0.019	−0.015	−0.091	**0.860**

5.2.3. Heterotrait–Monotrait Ratio of Correlations

In response to growing critiques of the Fornell and Larcker [117] criterion, particularly its limitations in reliably identifying discriminant validity issues in complex models, Henseler, Ringle and Sarstedt [118] proposed a more robust alternative: the heterotrait–monotrait (HTMT) ratio of correlations. Unlike traditional methods, HTMT leverages the multitrait–multimethod matrix to provide a stricter assessment of discriminant validity.

According to Kline [108], a threshold of 0.85 (HTMT.85) serves as a conservative benchmark; values exceeding this threshold indicate potential problems with discriminant validity. The adoption of HTMT reflects a broader shift toward advanced statistical rigor in structural equation modeling, prioritizing precision over conventional heuristic thresholds. In this study, discriminant validity was rigorously evaluated using the HTMT approach, with the results detailed in Table 6. All HTMT values fell well below the critical 0.85 threshold, confirming the distinctiveness of each construct and reinforcing the validity of the measurement model.

Table 6. Measurement of Heterotrait–Monotrait (HTMT).

	1	2	3	4	5	6
CHM						
ECB	0.089					
ENE	0.110	0.081				
SOP	0.282	0.172	0.220			
UBC	0.078	0.083	0.093	0.202		
VA	0.090	0.055	0.081	0.255	0.062	

5.2.4. Structural Model Assessment

The structural model assessment evaluated the hypothesized relationships between six latent constructs and the dependent variable, Satisfaction with High-Rise Development (SHD). Utilizing a bootstrapping method with 5000 subsamples in SmartPLS, the analysis generated estimates for path coefficients (β), standard deviations (STDEV), *t*-statistics, and effect sizes (f^2) (Table 7). The *t*-statistics, adhering to thresholds in structural equation modeling, confirmed significance at the 5% level ($t > 1.96$) and 1% level ($t > 2.58$). Effect sizes followed Cohen's guidelines (small: 0.02, medium: 0.15, and large: 0.35).

Table 7. Results of hypothesis testing and structural model significance.

	Path Coefficient (β)	Sample Mean (M)	Standard Deviation (STDEV)	*t*-Value	f-Square	Decision
H1: CHM -> SHD	0.254	0.256	0.048	5.304 **	0.089	Accepted
H2: ECB -> SHD	0.127	0.132	0.050	2.542 *	0.022	Accepted
H3: ENE -> SHD	0.209	0.213	0.047	4.457 **	0.061	Accepted
H4: SOP -> SHD	0.203	0.206	0.053	3.842 **	0.057	Accepted
H5: UBC-> SHD	0.302	0.303	0.047	6.377 **	0.126	Accepted
H6: VA -> SHD	0.230	0.232	0.050	4.640 **	0.074	Accepted

Critical *t*-values: * 1.96 ($p < 0.05$); ** 2.58 ($p < 0.01$).

The R-square (R^2) value, prominently displayed in the structural model diagram, is 0.289. This means 28.9% of the variance in Satisfaction with all the constructs (Figure 4). According to Cohen [119], an R^2 value exceeding 0.26 is considered substantial within social sciences, suggesting that the model provides a moderate and meaningful level of explanatory power. This solidifies the validity of the model framework and its relevance to understanding public satisfaction within the context of urban high-rise developments.

Cultural Harmony (CHM) exhibited a statistically significant positive relationship with SHD (β = 0.254, $t = 5.304$, $p < 0.01$), with a small-to-moderate effect size ($f^2 = 0.089$), indicating that alignment with cultural values and traditions meaningfully enhances satisfaction. Economic Benefit (ECB) demonstrated a weaker yet significant influence (β = 0.127, $t = 2.542$, $p < 0.05$), though its negligible effect size ($f^2 = 0.022$) suggests economic factors, while relevant, are secondary in shaping public approval. Environmental Experience (ENE) showed a β of 0.209 ($t = 4.457$, $p < 0.01$), with a small effect size ($f^2 = 0.061$), emphasizing the role of eco-friendly design and energy efficiency in fostering satisfaction. Social Perception (SOP) contributed positively (β = 0.203, $t = 3.842$, $p < 0.01$), with a small effect ($f^2 = 0.057$), highlighting the importance of community cohesion and equity in public endorsement.

Urban Connectivity (UBC) emerged as the strongest predictor (β = 0.302, $t = 6.377$, $p < 0.01$), with a near-medium effect size ($f^2 = 0.126$), underscoring the critical role of transport infrastructure and accessibility. Visual Appeal (VA) also significantly influenced satisfaction (β = 0.230, $t = 4.640$, $p < 0.01$), with a small-to-moderate effect ($f^2 = 0.074$), affirming that architectural aesthetics and design harmony are pivotal.

All hypotheses (H1–H6) were accepted, validating the model's strength. The consistent empirical backing of these hypotheses underscores the model's capacity to capture the interplay of factors influencing urban satisfaction. The results reveal that satisfaction with high-rise development is multi-dimensional, driven predominantly by functional factors like Urban Connectivity, cultural alignment, and aesthetics, alongside environmental and social considerations. Economic factors, though statistically significant, had the weakest impact. Figure 9 graphically presents the structural model by annotating each hypothesized path with its standardized coefficient and *t*-statistic and showing the overall explanatory power ($R^2 = 0.289$), thus providing a rapid visual corroboration of the hypothesis-testing results detailed in Table 7.

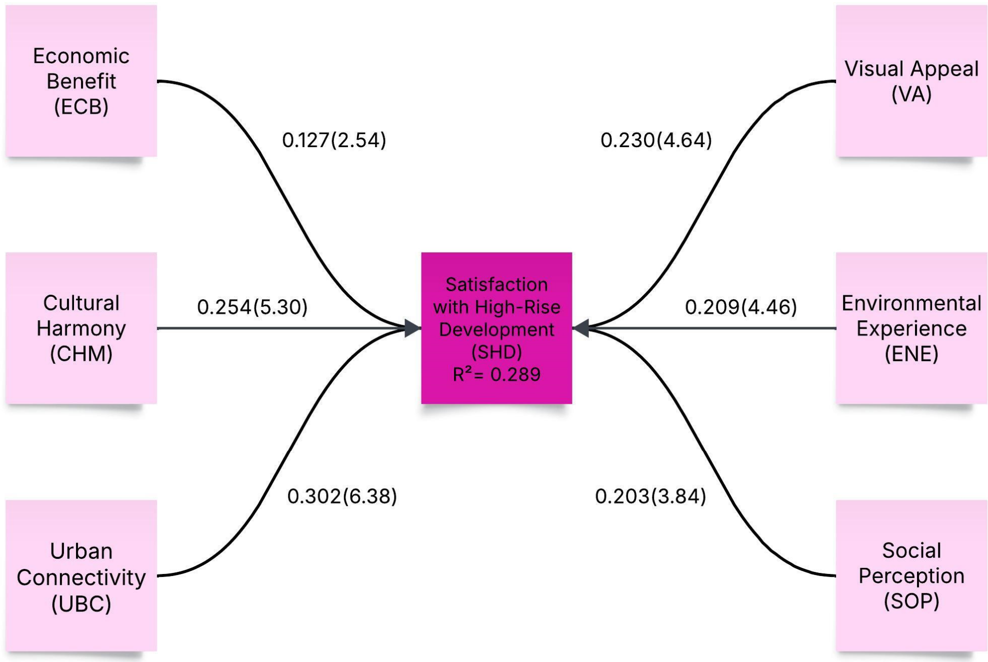

Figure 9. Structural model relationships illustrating standardized path coefficients and corresponding *t*-statistics (in parentheses) for the hypothesized links between latent constructs.

5.2.5. Overall Model Fitness Analysis

To confirm the global validity and explanatory strength of the structural equation model developed for this study, the overall model fitness was assessed using the Goodness-of-Fit (GoF) index. The GoF serves as a metric that integrates both the measurement model and the structural model into a single evaluation, offering a holistic view of the model's performance. As defined by Tenenhaus et al. [120], the GoF index is calculated as the geometric mean of the average R^2 of the endogenous latent variable(s) and the average communality (AVE) of all constructs, thus bridging the model's predictive power and the shared variance among indicators.

In the context of this research, the GoF index was essential for examining how well the model, which explains "Satisfaction with High-Rise Development (SHD)", performs both at the structural level (relationships between constructs) and at the measurement level (the quality of manifest variables). This dual perspective ensures that the model is not only statistically sound but also practically meaningful in predicting public satisfaction in Muscat's high-rise development context.

Several studies have provided benchmarks for interpreting the GoF index. Specifically, guidelines from Wetzels et al. [121], Hair, Black, Babin and Anderson [111], and Tenenhaus, Vinzi, Chatelin and Lauro [120] suggest that a communality threshold of 0.50 and R^2 values with small (0.02), medium (0.13), and large (0.26) effect sizes are suitable indicators for assessing model strength. Accordingly, the GoF can be categorized as

$$GoF_{small} = \sqrt{0.50 \times 0.02} = \sqrt{0.010} \approx 0.10 \quad (1)$$

$$GoF_{medium} = \sqrt{0.50 \times 0.13} = \sqrt{0.065} \approx 0.255 \quad (2)$$

$$GoF_{large} = \sqrt{0.50 \times 0.26} = \sqrt{0.130} \approx 0.361 \quad (3)$$

Any GoF value exceeding 0.36 indicates a substantial model fit in the context of social science research. In this study, the R^2 value of the endogenous latent variable SHD was 0.289 (as shown in the structural model results and Figure 5). The Average Variance Extracted (AVE) for all constructs was computed based on the measurement model results and yielded an average AVE of 0.673 across the six latent constructs. The GoF index was then calculated using the following standard formula:

$$GoF = \sqrt{AVE \times R^2} \quad (4)$$

$$GoF = \sqrt{0.673 \times 0.289} \approx 0.44 \quad (5)$$

This result, GoF = 0.44, surpasses the large effect size threshold (0.36), confirming that the overall model demonstrates strong explanatory power and good global validity. Such a result substantiates that the model is both statistically sound and practically applicable, effectively capturing the complex relationships between perceived environmental and social factors and their influence on satisfaction with high-rise developments in Muscat.

6. Discussion

This study examined six determinants of public satisfaction with high-rise development in Muscat—Cultural Harmony, Economic Benefit, Environmental Experience, Social Perception, Urban Connectivity and Visual Appeal. The structural model accounted for 28.9% of the variance in Satisfaction with High-Rise Development (SHD; R^2 = 0.289). All six paths were positive and significant, but their magnitudes varied sharply. Urban Connectivity exerted the greatest influence, underscoring the primacy of walkability, transit access and street integration in shaping public sentiment. Cultural Harmony followed, indicating that designs aligned with Omani heritage materially bolstered acceptance. Visual Appeal ranked third, confirming the city's sensitivity to skyline aesthetics. Mid-tier effects were observed for Environmental Experience and Social Perception, while Economic Benefit, though still significant, registered the smallest coefficient. To crystallize the findings, Table 8 arranges the six public satisfaction drivers from most to least influential and pairs each with its key survey cues and the corresponding planning strategies.

Urban Connectivity yields the largest and most robust influence in the structural model (β = 0.302, t = 6.38). A 1-standard-deviation improvement in perceived connectivity, captured by survey items UBC1 (walkable block length), UBC2 (continuous sidewalks) and UBC3 (transit proximity), translates into roughly a 0.30-standard-deviation rise in overall public satisfaction with high-rise development. This dominant effect aligns with Gulf region mobility studies that rank walkability and multimodal access as primary livability drivers [102,122] and with Muscat's own 2040 Mobility Strategy, which calls for integrated feeder bus and pedestrian networks to accompany vertical growth [123]. In the capital's linear coastal urban form, residents clearly judge any new tower district by its ability to shorten travel distances and link seamlessly to public transport. Planners aiming to maximize public approval should therefore priorities street network permeability upgrades and transit integration before sanctioning further high-rise projects.

The model quantifies Cultural Harmony as the second strongest driver of satisfaction (β = 0.254, t = 5.30). The construct is captured by the three items CHM1 (respect for Omani architectural motifs), CHM2 (compatibility with traditional streetscapes) and CHM3 (the preservation of cultural heritage). Each item loads strongly on its latent factor (0.811–0.868), confirming that respondents are clearly satisfied with projects that honor local identity. In practical terms, a one-standard-deviation rise in perceived cultural congruence lifts overall satisfaction by roughly a quarter of a standard deviation, an effect 2× larger than the economic benefit coefficient. This numerical weight corroborates earlier qualitative claims that Muscat's skyline is judged as much by its vernacular cues as by its utility [78]. It also mirrors Gulf-wide evidence, where culturally aligned developments record up to 30% higher occupancy and price premiums [14,74]. The results therefore confirm that high-rise schemes gain public legitimacy when façades, materials and spatial layouts echo Islamic motifs and courtyard logic, reinforcing collective memory rather than eroding it.

Table 8. Ranked influence of the six latent constructs on public satisfaction with high-rise development in Muscat, with indicative survey cues and strategies.

Rank	Construct (Latent Code)	Empirical Signal [1]	Core Insight	Key Survey Items	Practical Takeaway for Planners
1	Urban Connectivity (UBC)	Largest, most robust driver of satisfaction	Residents rate walkability, street permeability and transit proximity above all else when judging high-rise areas.	UBC1—walkable block length UBC2—continuous shaded sidewalks UBC3—distance to bus/BRT stop	Break super-blocks, add shaded footpaths, integrate feeder bus loops before approving new towers.
2	Cultural Harmony (CHM)	Second strongest influence	Façades, materials and layouts that echo Omani motifs materially boost acceptance.	CHM1—respect for vernacular motifs CHM2—compatibility with traditional streetscapes CHM3—heritage preservation	Embed vernacular palettes, step heights near heritage zones, require courtyard elements.
3	Visual Appeal (VA)	Third strongest influence	Design quality and skyline contribution remain critical; aesthetics have "regulatory teeth."	VA1—façade articulation VA2—skyline contribution VA3—material quality	Maintain rigorous design review; enforce massing and color palette guidelines from the Urban Design Manual.
4	Environmental Experience (ENE)	Mid-tier but significant	Heat mitigation and energy efficiency are now baseline expectations, not add-ons.	ENE1—thermal comfort ENE2—energy-efficiency performance ENE3—micro-climate quality	Make high-albedo skins, deep shading and vegetated podiums standard; reward passive-cooling design.
5	Social Perception (SOP)	Mid-tier, statistically robust	Kinship culture demands vertical projects replicate everyday social interaction.	SOP1—sense of neighborliness SOP2—trust in fellow residents SOP3—quality of shared spaces	Provide semi-private lobbies, communal terraces and mixed-tenure floor clusters to sustain social capital.
6	Economic Benefit (ECB)	Smallest yet still significant	Residents look for tangible job creation and local economy multipliers, but only after livability factors.	ECB1—local job generation ECB2—business and retail turnover ECB3—property value uplift	Tie approvals to local employment targets and SME tenancy incentives; publicize multiplier studies.

[1] Relative ordering derived from the PLS-SEM structural model (R^2 = 0.289); all six paths are positive and significant.

Muscat's façade-control regulations place visual coherence at the center of planning practice, a priority clearly reflected in the survey results. Visual Appeal ranks as the third-strongest driver of satisfaction, with a standardized path coefficient of β = 0.230

($t = 4.64$). Strong loadings on façade articulation (VA1), skyline contribution (VA2) and material quality (VA3) confirm that elevating perceived aesthetics yields an immediate uptick in public satisfaction. In other words, a noticeable gain in perceived aesthetics yields an immediate, city-wide rise in acceptance of high-rise growth. This quantitative evidence validates Muscat's Urban Design Manual, which mandates restrained color palettes, proportionate massing and vernacular motifs to prevent discordant skylines [1], and it echoes Gulf-wide post-occupancy studies that list architectural quality among the top livability factors [51]. Design excellence, therefore, is not a stylistic luxury but a measurable lever for public approval and tourism marketing; maintaining a rigorous design review process as the skyline climbs will be essential for protecting place identity, sustaining civic pride and safeguarding long-term market value.

Social Perception shows a positive and statistically robust influence on satisfaction ($\beta = 0.203$; $t = 3.84$; $p < 0.001$). The construct is measured by three items, SOP1 (the sense of neighborliness), SOP2 (trust in fellow residents) and SOP3 (the quality of shared spaces), all of which load strongly on the latent factor. A 1-standard-deviation increase across these aspects yields about a 0.20-standard-deviation rise in overall approval of high-rise living. In Oman, where kinship ties and communal solidarity are deeply rooted cultural norms [124], this effect underscores the necessity for vertical projects to recreate opportunities for everyday social interaction. Practical design responses include generous communal terraces, semi-private floor lobbies and mixed-tenure clusters that preserve the informal contact typical of low-rise neighborhoods [91,125]. Consistent with the resilience literature that treats social capital as a prerequisite for adaptable, livable cities [126], Muscat's planners must view these social–spatial provisions as essential infrastructure rather than optional embellishments.

Environmental Experience occupies a vital position in the predictor set ($\beta = 0.209$, $t = 4.46$). The construct is captured by three strongly loaded indicators, ENE1 (perceived thermal comfort), ENE2 (energy efficiency performance) and ENE3 (the quality of the surrounding micro-climate), showing that residents now regard heat mitigation and resource frugality as standard design duties, not optional upgrades. In Muscat's hot, arid setting, passive strategies such as high-albedo façades, deep horizontal shading, cross-ventilation paths and vegetated podiums have proven effective at moderating heat gain and improving outdoor comfort in comparable Gulf developments [90,127]. Survey comments reinforce this perception, with many respondents praising high-rise schemes that incorporate breezeways, green terraces and reflective materials. These qualitative cues, taken together with the positive coefficient, confirm that projects coupling vertical density with demonstrable environmental performance are better positioned to earn lasting public approval and strengthen Muscat's image as a climate-adapted tourism destination.

Although Economic Benefit yields the weakest, but still statistically significant, path coefficient in the model ($\beta = 0.127$, $t = 2.54$), favorable views of job creation (ECB1), higher retail turnover (ECB2), and increases in property values (ECB3) nonetheless enhance public satisfaction. Although its influence trails the five non-monetary dimensions, the positive coefficient shows that residents do consider whether a tower will broaden employment prospects and strengthen the local economy. This resonates with the economic diversification targets set out in Oman's Vision 2040 [22] and with recent community consultations where participants asked developers to quantify supply chain and tenancy multipliers before granting support [128]. Mixed-use schemes that embed space for small enterprises or anchor local suppliers are therefore more likely to secure public endorsement, demonstrating that financial returns, though secondary to connectivity or cultural fit, remain an essential component of the approval calculus and of wider tourism-led diversification goals.

Implications for Theory and Practice

From a theoretical standpoint, this study advances urban satisfaction scholarship by demonstrating, with empirical ranking, that functional access and cultural consonance eclipse purely economic or environmental considerations in a Gulf city context. The structural model explains the variance in public satisfaction and orders the six drivers in a clear hierarchy, Urban Connectivity > Cultural Harmony > Visual Appeal ≈ Environmental Experience ≈ Social Perception > Economic Benefit. This evidence challenges earlier frameworks that treated economic growth or environmental quality as the primary levers of acceptance [14,91] and confirms that culturally embedded and mobility-oriented metrics must sit at the core of any explanatory model for rapidly modernizing, heritage-rich cities. By empirically validating the weight of Cultural Harmony and Social Perception, this research extends the sustainable urbanism literature beyond Western cases and answers recent calls to integrate place identity and social well-being into high-density development theory [105,129].

Practically, the results translate into a ranked action agenda for Muscat and similar Gulf cities. First, strengthen street permeability, shaded walkways and feeder bus networks because these yield the largest marginal gain in resident approval. Second, codify façade palettes, massing rules and vernacular motifs so that new towers respect Omani heritage, an imperative underscored by the strong showing of Cultural Harmony and Visual Appeal. Third, bundle ecologically responsible envelopes with demonstrable local-economy multipliers: while Environmental Experience and Economic Benefit carry smaller coefficients, their statistical significance indicates that residents still expect tangible energy savings and job creation from vertical projects. Incentives for green materials, on-site renewable systems and SME tenancy clauses address these dual expectations. By aligning the scale of policy intervention with the empirically observed influence of each driver, this study offers a data-driven roadmap for inclusive and sustainable high-rise growth, one that can be transferred to other fast-growing cities where modernization, heritage and tourism adaptation must be reconciled.

7. Conclusions

This study offers a clear empirical message for urban governance in Muscat and the wider Gulf: when residents judge high-rise districts, functional mobility and cultural integration count far more than abstract economic gains. By mapping the relative weight of six design and policy levers, we show that satisfaction hinges first on how easily people can walk, ride transit and reach daily services, an insight that challenges the conventional assumption that heritage or investment returns top the public agenda.

Urban connectivity emerges as the single most powerful driver of approval, underscoring the urgency of retrofitting Muscat's linear, car-dependent fabric before permitting additional towers. Close behind are cultural harmony and visual appeal: buildings that echo Omani form language and contribute positively to the skyline earn markedly higher favor, confirming that heritage cues and architectural quality are non-negotiable performance criteria rather than decorative extras. Environmental comfort and opportunities for social interaction occupy the middle tier, reflecting a growing baseline expectation that new high-rises will mitigate heat and foster societal life. Economic benefits, though welcome, rank last; residents accept them only after livability and identity needs have been demonstrably met.

These findings demand a reversal in policy sequencing. Street network upgrades and transit integration should precede height approvals, while façade reviews, material palettes and heritage-sensitive massing must be enforced as rigorously as structural safety codes. Economic incentives such as tax breaks or density bonuses should reward tangible gains in thermal efficiency, shared social space and support for small local businesses—rather than simply encouraging more floor space or higher investment totals.

Theoretically, the revealed hierarchy, mobility and culture ahead of aesthetics, the environment and finally economics inverts the priorities typically observed in European or East Asian vertical growth models and exposes an "economics-secondary" paradox: fiscal promises boost satisfaction only after non-negotiable livability thresholds are in place. In recasting Muscat's skyline, this study therefore converts broad ambitions for sustainability and cultural preservation into an actionable sequence: first, connect towers to streets, then root them in local heritage, and only afterwards calibrate the economic case. By linking each regulatory lever to its measured weight in public satisfaction, this study converts broad aims such as "livability," "heritage protection," and "economic diversification" into a concrete, actionable checklist for guiding Muscat's skyline toward socially legitimate and culturally grounded and tourism-supportive vertical urbanism.

8. Limitations and Future Research Directions

While this study offers valuable contributions to understanding public satisfaction with high-rise developments in Muscat, several limitations should be acknowledged to contextualize its findings. First, the use of a cross-sectional design inherently restricts the ability to establish causal relationships between the studied constructs. Although significant associations were identified, the temporal dynamics of residents' perceptions, such as how satisfaction might evolve as high-rise developments mature, remain unexplored. Future longitudinal studies could provide deeper insights into these temporal changes, capturing evolving attitudes over time.

Second, while the sample size of 300 respondents exceeds the minimum requirements for PLS-SEM analysis and ensures statistical strength [108], it was geographically confined to Muscat. As a result, the findings may not be fully generalizable to the Western context, where socio-cultural dynamics and urban development patterns may differ. Moreover, Oman's diverse regional identities mean that residents' perceptions in more rural or conservative areas might diverge significantly from Western culture. Expanding the geographic scope in future research would enable more nuanced comparisons across different Omani cities and perhaps the broader Gulf region.

Third, this study relied exclusively on self-reported survey data, which, while efficient for capturing subjective perceptions, is susceptible to common method biases such as social desirability bias and response consistency effects [114]. Although diagnostic tests, such as Harman's single-factor test, confirmed that common method variance was within acceptable limits, inherent limitations of self-reporting remain. Employing mixed-methods approaches, such as combining surveys with focus groups or in-depth interviews, could provide richer, triangulated data and deeper contextual understanding.

Fourth, emerging variables also warrant exploration. For instance, future studies could investigate the role of technological integration, such as smart building features, energy-efficient systems, and digital connectivity, and their impact on satisfaction and sustainability perceptions. Furthermore, conducting post-occupancy evaluations could provide invaluable feedback on how well developments meet residents' long-term expectations and functional needs.

Finally, this research emphasized residents' perceptions of current high-rise developments, without distinguishing between older, established projects and newer constructions. Given Muscat's ongoing urban transformation, perceptions may differ based on the age, design, or maintenance of specific buildings, a nuance that future research should address to unpack potential intra-category variation.

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References

1. Aljabri, H. The Planning and Urban Design of Liveable Public Open Spaces in Oman: Case Study of Muscat. Ph.D. Thesis, Heriot-Watt University, Edinburgh, UK, 2014.
2. Hegazy, S. Continuity and change of Muscat house–influencing factors and responses. *Int. J. Adv. Res.* **2015**, *3*, 95–107.
3. Architects, Z.H. Al Khuwair Muscat Downtown and Waterfront Development. Available online: https://www.zaha-hadid.com/architecture/al-khuwair-muscat-downtown-and-waterfront-development/ (accessed on 26 June 2025).
4. Venter, C.J. Measuring the quality of the first/last mile connection to public transport. *Res. Transp. Econ.* **2020**, *83*, 100949. [CrossRef]
5. Hashemnezhad, H.; Heidari, A.A.; Mohammad Hoseini, P. "Sense of place" and "place attachment". *Int. J. Archit. Urban Dev.* **2013**, *3*, 5–12.
6. Danese, M.; Nolè, G.; Murgante, B. Visual impact assessment in urban planning. In *Geocomputation and Urban Planning*; Springer: Berlin/Heidelberg, Germany, 2009; pp. 133–146.
7. Marans, R.W. Quality of urban life studies: An overview and implications for environment-behaviour research. *Procedia-Soc. Behav. Sci.* **2012**, *35*, 9–22. [CrossRef]
8. Forrest, R.; Kearns, A. Social cohesion, social capital and the neighbourhood. *Urban Stud.* **2001**, *38*, 2125–2143. [CrossRef]
9. Lee, P.; Burfitt, A.; Tice, A. The creative economy and social sustainability: Planning for opportunity and growth. *Built Environ.* **2009**, *35*, 267–280. [CrossRef]
10. Sirgy, M.J.; Cornwell, T. How neighborhood features affect quality of life. *Soc. Indic. Res.* **2002**, *59*, 79–114. [CrossRef]
11. Giridharan, R.; Ganesan, S.; Lau, S. Daytime urban heat island effect in high-rise and high-density residential developments in Hong Kong. *Energy Build.* **2004**, *36*, 525–534. [CrossRef]
12. Lotfabadi, P. High-rise buildings and environmental factors. *Renew. Sustain. Energy Rev.* **2014**, *38*, 285–295. [CrossRef]
13. Kalantari, S.; Shepley, M. Psychological and social impacts of high-rise buildings: A review of the post-occupancy evaluation literature. *Hous. Stud.* **2021**, *36*, 1147–1176. [CrossRef]
14. Al-Kodmany, K. The sustainability of tall building developments: A conceptual framework. *Buildings* **2018**, *8*, 7. [CrossRef]
15. Wener, R.; Carmalt, H. Environmental psychology and sustainability in high-rise structures. *Technol. Soc.* **2006**, *28*, 157–167. [CrossRef]
16. Ahlfeldt, G.M.; Barr, J. The economics of skyscrapers: A synthesis. *J. Urban Econ.* **2022**, *129*, 103419. [CrossRef]
17. Alkamali, N.; Alhadhrami, N.; Alalouch, C. Muscat City expansion and Accessibility to the historical core: Space syntax analysis. *Energy Procedia* **2017**, *115*, 480–486. [CrossRef]

18. Zahiri, N.; Dezhdar, O.; Foroutan, M. Rethinking of critical regionalism in high-rise buildings. *Buildings* **2017**, *7*, 4. [CrossRef]
19. Hilal, N.A.; Haggag, M.; Saleh, A.D. Optimizing Energy Efficiency in High-Rise Residential Buildings in Abu Dhabi's Hot Climate: Exploring the Potential of Double Skin Façades. *Buildings* **2023**, *13*, 2148. [CrossRef]
20. Alotaibi, F.; Sinclair, B.R. Building tall in the Arabian Gulf: Perception, performance, place-making. In Proceedings of the ARCC 2015: Future of Architectural Research, Chicago, IL, USA, 6–9 April 2015; pp. 394–403.
21. Zaidan, E.; Abulibdeh, A. Master planning and the evolving urban model in the Gulf cities: Principles, policies, and practices for the transition to sustainable urbanism. *Plan. Pract. Res.* **2021**, *36*, 193–215. [CrossRef]
22. Government of Oman. *Oman Vision 2040: National Implementation Framework*; Supreme Council for Planning: Muscat, Oman, 2020.
23. Mohit, M.A.; Ibrahim, M.; Rashid, Y.R. Assessment of residential satisfaction in newly designed public low-cost housing in Kuala Lumpur, Malaysia. *Habitat Int.* **2010**, *34*, 18–27. [CrossRef]
24. Mouratidis, K. Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being. *Cities* **2021**, *115*, 103229. [CrossRef]
25. Kyttä, M.; Broberg, A.; Haybatollahi, M.; Schmidt-Thomé, K. Urban happiness: Context-sensitive study of the social sustainability of urban settings. *Environ. Plan. B Plan. Des.* **2016**, *43*, 34–57. [CrossRef]
26. Lewicka, M. Place attachment: How far have we come in the last 40 years? *J. Environ. Psychol.* **2011**, *31*, 207–230. [CrossRef]
27. Scannell, L.; Gifford, R. Defining place attachment: A tripartite organizing framework. *J. Environ. Psychol.* **2010**, *30*, 1–10. [CrossRef]
28. Liu, Y.; Geertman, S.; Van Oort, F.; Lin, Y. Making the 'Invisible' Visible: Redevelopment-induced Displacement of Migrants in Shenzhen, China. *Int. J. Urban Reg. Res.* **2018**, *42*, 483–499. [CrossRef]
29. Kim, S.; Kwon, H.-a. Sustainable regeneration through the cultural conversion of urban heritage. *Sustainability* **2020**, *12*, 2932. [CrossRef]
30. Elsheshtawy, Y. Urban enclaves and transient cosmopolitanism: Scenes from Abu Dhabi and Dubai. *City* **2020**, *24*, 805–817. [CrossRef]
31. Qaid, A.; Lamit, H.B.; Ossen, D.R.; Shahminan, R.N.R. Urban heat island and thermal comfort conditions at micro-climate scale in a tropical planned city. *Energy Build.* **2016**, *133*, 577–595. [CrossRef]
32. Liu, C.H.; Rosenthal, S.S.; Strange, W.C. The vertical city: Rent gradients, spatial structure, and agglomeration economies. *J. Urban Econ.* **2018**, *106*, 101–122. [CrossRef]
33. Fukuda, Y. Land prices and agglomeration: Theory and evidence from the Tokyo metropolitan area. *J. Jpn. Int. Econ.* **2020**, *58*, 101094. [CrossRef]
34. Al-Kodmany, K. Refashioning Cities in the Middle East: The Case of Dubai. *Int. J. High-Rise Build.* **2024**, *13*, 11–32.
35. Kearns, A.; Whitley, E.; Mason, P.; Bond, L. 'Living the high life'? Residential, social and psychosocial outcomes for high-rise occupants in a deprived context. *Hous. Stud.* **2012**, *27*, 97–126. [CrossRef]
36. Evans, G.W.; Wells, N.M.; Moch, A. Housing and mental health: A review of the evidence and a methodological and conceptual critique. *J. Soc. Issues* **2003**, *59*, 475–500. [CrossRef]
37. Yim, S.H.L.; Fung, J.C.H.; Lau, A.K.H.; Kot, S.C. Air ventilation impacts of the "wall effect" resulting from the alignment of high-rise buildings. *Atmos. Environ.* **2009**, *43*, 4982–4994. [CrossRef]
38. Ma, Y.X.; Ava, C.Y. Impact of urban heat island on high-rise residential building cooling energy demand in Hong Kong. *Energy Build.* **2024**, *311*, 114127. [CrossRef]
39. Wiedmann, F.; Salama, A.M.; Ibrahim, H.G.; Mirincheva, V. New housing patterns and spatial fragmentation in Gulf cities. *J. Urban.* **2019**, *12*, 393–411. [CrossRef]
40. Friedmann, J. Globalization and the emerging culture of planning. *Prog. Plan.* **2005**, *64*, 183–234. [CrossRef]
41. Fox, J.W.; Nada, M.-S.; Al-Mutawa, M. The Arab Gulf region: Traditionalism globalized or globalization traditionalized? In *Globalization and the Gulf*; Routledge: London, UK, 2006; pp. 3–59.
42. Acuto, M. High-rise Dubai urban entrepreneurialism and the technology of symbolic power. *Cities* **2010**, *27*, 272–284. [CrossRef]
43. Al-Gharibi, H. *Urbanisation and Changing Lifestyle Patterns in Muscat*; Habitat International: Berlin, Germany, 2016; Volume 21.
44. Xue, P.; Mak, C.M.; Ai, Z. A structured approach to overall environmental satisfaction in high-rise residential buildings. *Energy Build.* **2016**, *116*, 181–189. [CrossRef]
45. Harris, A. Vertical urbanisms: Opening up geographies of the three-dimensional city. *Prog. Hum. Geogr.* **2015**, *39*, 601–620. [CrossRef]
46. Beaugrand, C.; Le Renard, A.; Stadnicki, R. Beyond the skyline: Cities in transformation in the Arabian Peninsula. *Arab. Humanit.* **2013**, *2*. [CrossRef]
47. Mahgoub, Y.; Abbara, B. Tall buildings legislations in Doha, Qatar. *Procedia-Soc. Behav. Sci.* **2012**, *36*, 640–649. [CrossRef]
48. Turner, A. Political Economy of Tourism Development in the Gulf: The cases of Muscat and Doha. In *Routledge Handbook on Middle East Cities*; Routledge: London, UK, 2019; pp. 390–405.

49. Scholz, W. Appropriate Housing Typologies, Effective Land Management and the Question of Density in Muscat, Oman. *Sustainability* **2021**, *13*, 12751. [CrossRef]
50. De Siqueira, G.; Al Balushi, A. Co-designing the pedestrian revolution in Muscat. *City Territ. Archit.* **2020**, *7*, 11. [CrossRef]
51. De Siqueira, G.; Mabry, R.; Al Siyabi, H.; Adeel, A.; Malaj, S.; Oyeyemi, A. Construct validity of the physical activity neighborhood environment scale-Oman. *Front. Public Health* **2023**, *11*, 1007075. [CrossRef]
52. Muneer, A. City Identity—The Curious Case of Muscat. *Int. J. Archit. Infrastruct. Plan.* **2023**, *9*, 29–41.
53. El Amrousi, M.; Biln, J. Muscat emerging: Tourism and cultural space. *J. Tour. Cult. Change* **2010**, *8*, 254–266. [CrossRef]
54. Tannous, H.O.; Major, M. The Spatial Logic of the Arabian Coastal City: The Case of Doha, State of Qatar and Muscat, Sultanate of Oman. In Proceedings of the 5th ISUF-Italia International Conference: Urban Substrata & City Regeneration—Morphological Legacies and Design Tools, Rome, Italy, 19–22 February 2020; pp. 287–303.
55. Cheung, D.M.-w.; Tang, B.-s. Social order, leisure, or tourist attraction? The changing planning missions for waterfront space in Hong Kong. *Habitat Int.* **2015**, *47*, 231–240. [CrossRef]
56. Nguyen, L.P.; van den Berg, P.E.; Kemperman, A.D.; Mohammadi, M. Social impacts of living in high-rise apartment buildings: The effects of buildings and neighborhoods. *J. Urban Aff.* **2024**, 1–22. [CrossRef]
57. Barrie, H.; McDougall, K.; Miller, K.; Faulkner, D. The social value of public spaces in mixed-use high-rise buildings. *Build. Cities* **2023**, *4*, 669–689. [CrossRef]
58. Lee, S.-W.; Seow, C.-W.; Xue, K. Residents' sustainable city evaluation, satisfaction and loyalty: Integrating importance-performance analysis and structural equation modelling. *Sustainability* **2021**, *13*, 6766. [CrossRef]
59. Lei, B.; Liu, P.; Liang, X.; Yan, Y.; Biljecki, F. Developing the urban comfort index: Advancing liveability analytics with a multidimensional approach and explainable artificial intelligence. *Sustain. Cities Soc.* **2025**, *120*, 106121. [CrossRef]
60. Webb, B.; White, J.T. Planning and the High-Rise Neighbourhood: Debates on Vertical Cities. *Urban Plan.* **2022**, *7*, 208–212. [CrossRef]
61. Nethercote, M. Melbourne's vertical expansion and the political economies of high-rise residential development. *Urban Stud.* **2019**, *56*, 3394–3414. [CrossRef]
62. Ramakreshnan, L.; Aghamohammadi, N.; Fong, C.S.; Ghaffarianhoseini, A.; Ghaffarianhoseini, A.; Wong, L.P.; Hassan, N.; Sulaiman, N.M. A critical review of Urban Heat Island phenomenon in the context of Greater Kuala Lumpur, Malaysia. *Sustain. Cities Soc.* **2018**, *39*, 99–113. [CrossRef]
63. Ilgın, H.E.; Aslantamer, Ö.N. Comparative Analysis of Space Efficiency in Skyscrapers with Prismatic, Tapered, and Free Forms. *Buildings* **2024**, *14*, 3345. [CrossRef]
64. Sheikh, N.B.; Arif, M.M.; Laverge, J.; Delghust, M. Integrating Land Use and Transport for Energy Efficiency: Enabling Urban Transformation and Combating Environmental Pollution. *CIB Conf.* **2025**, *1*, 9. [CrossRef]
65. Rashdan, W.; Ashour, A.F. Heritage-Inspired Strategies in Interior Design: Balancing Critical Regionalism and Reflexive Modernism for Identity Preservation. *Heritage* **2024**, *7*, 6825–6856. [CrossRef]
66. Abbaszadeh, S.; Ibrahim, R.; Baharuddin, M.N.; Salim, A. Identifying Persian traditional socio-cultural behaviors for application in the design of modern highrise residences. *Int. J. Archit. Res.* **2009**, *3*, 116–132.
67. Lloyd, K.; Fullagar, S.; Reid, S. Where is the 'social'in constructions of 'liveability'? Exploring community, social interaction and social cohesion in changing urban environments. *Urban Policy Res.* **2016**, *34*, 343–355. [CrossRef]
68. Du, P.; Wood, A.; Ditchman, N.; Stephens, B. Life satisfaction of downtown high-rise vs. suburban low-rise living: A Chicago case study. *Sustainability* **2017**, *9*, 1052. [CrossRef]
69. Cervero, R. Integration of urban transport and urban planning. In *The Challenge of Urban Government: Policies and Practices*; World Bank: Washington, DC, USA, 2001; pp. 407–427.
70. Gehl, J. *Cities for People*; Island Press: Washington, DC, USA, 2013.
71. French, S.; Wood, L.; Foster, S.A.; Giles-Corti, B.; Frank, L.; Learnihan, V. Sense of community and its association with the neighborhood built environment. *Environ. Behav.* **2014**, *46*, 677–697. [CrossRef]
72. Nasar, J.L. Using scientific research methods in assessing visual aesthetic quality. In *Architecture Beyond Criticism*; Routledge: London, UK, 2014; pp. 241–250.
73. Carmona, M. *Public Places Urban Spaces: The Dimensions of Urban Design*; Routledge: London, UK, 2021.
74. Salama, A.M.; Wiedmann, F. *Demystifying Doha: On Architecture and Urbanism in an Emerging City*; Routledge: London, UK, 2016.
75. Neill, W. *Urban Planning and Cultural Identity*; Routledge: London, UK, 2003.
76. Longstreth, R.W. *Cultural Landscapes: Balancing Nature and Heritage in Preservation Practice*; University of Minnesota Press: Minneapolis, MN, USA, 2008.
77. Nasser, N. Cultural continuity and meaning of place: Sustaining historic cities of the Islamicate world. *J. Archit. Conserv.* **2003**, *9*, 74–89. [CrossRef]
78. Al-Belushi, M.A.K.; Al-Hooti, N.A. Preserving the Past, Shaping the Present: Insights on Oman's Built Heritage and Its Identity. *Eur. J. Archit. Urban Plan.* **2023**, *2*, 1–5. [CrossRef]

79. Wood, A. Rethinking the skyscraper in the ecological age: Design principles for a new high-rise vernacular. *Int. J. High-Rise Build.* **2015**, *4*, 91–101.
80. Bianca, S. *Urban Form in the Arab World: Past and Present*; vdf Hochschulverlag AG: Zollikon, Switzerland, 2000; Volume 46.
81. Ponzini, D. Large scale development projects and star architecture in the absence of democratic politics: The case of Abu Dhabi, UAE. *Cities* **2011**, *28*, 251–259. [CrossRef]
82. Perera, B.; Samarakkody, A.L.; Nandasena, S.R. Managing financial and economic risks associated with high-rise apartment building construction in Sri Lanka. *J. Financ. Manag. Prop. Constr.* **2020**, *25*, 143–162. [CrossRef]
83. Searle, G.; Filion, P. Planning context and urban intensification outcomes: Sydney versus Toronto. *Urban Stud.* **2011**, *48*, 1419–1438. [CrossRef]
84. Graham, S.; Marvin, S. *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*; Routledge: London, UK, 2002.
85. Nebel, S.; Von Richthofen, A. *Urban Oman: Trends and Perspectives of Urbanisation in Muscat Capital Area*; LIT Verlag: Münster, Germany, 2016.
86. Ye, C.; Yao, L.; Meng, Y.; Zhang, Y.; He, G. Post-occupancy evaluation of green technologies for a high-rise building based on user experience. *Sustainability* **2022**, *14*, 9538. [CrossRef]
87. Nugroho, N.Y.; Triyadi, S.; Wonorahardjo, S. Effect of high-rise buildings on the surrounding thermal environment. *Build. Environ.* **2022**, *207*, 108393. [CrossRef]
88. Cheng, V.; Ng, E.; Chan, C.; Givoni, B. Outdoor thermal comfort study in a sub-tropical climate: A longitudinal study based in Hong Kong. *Int. J. Biometeorol.* **2012**, *56*, 43–56. [CrossRef]
89. Al-Hemoud, A.; Gasana, J.; Al-Dabbous, A.; Alajeel, A.; Al-Shatti, A.; Behbehani, W.; Malak, M. Exposure levels of air pollution (PM2. 5) and associated health risk in Kuwait. *Environ. Res.* **2019**, *179*, 108730. [CrossRef]
90. Wong, N.H.; Huang, B. Comparative study of the indoor air quality of naturally ventilated and air-conditioned bedrooms of residential buildings in Singapore. *Build. Environ.* **2004**, *39*, 1115–1123. [CrossRef]
91. Gifford, R. The consequences of living in high-rise buildings. *Archit. Sci. Rev.* **2007**, *50*, 2–17. [CrossRef]
92. Dash, S.P.; Shetty, A. Transitional Spaces as an Integrated Design Approach Enhancing Social Cohesion in High-Rise Dwellings. In *SDGs in the Asia and Pacific Region*; Springer: Berlin/Heidelberg, Germany, 2024; pp. 1–18.
93. Lee, J. Quality of life and semipublic spaces in high-rise mixed-use housing complexes in South Korea. *J. Asian Archit. Build. Eng.* **2011**, *10*, 149–156. [CrossRef]
94. Fatma, A.-H. Social Sustainability and Globalization; and the Role of Souq Mutrah in Muscat-Oman. *Environ. Sci. Sustain. Dev.* **2023**, *8*, 10–24.
95. Gang, J. Three points of the residential high-rise: Designing for social connectivity. *Int. J. High-Rise Build.* **2016**, *5*, 117–125. [CrossRef]
96. Al-Kodmany, K.; Xue, Q.; Sun, C. Reconfiguring vertical urbanism: The example of tall buildings and transit-oriented development (TB-TOD) in Hong Kong. *Buildings* **2022**, *12*, 197. [CrossRef]
97. Al-Mohannadi, M.; Awwaad, R.; Furlan, R.; Grosvald, M.; Al-Matwi, R.; Isaifan, R.J. Sustainable status assessment of the transit-oriented development in Doha's education city. *Sustainability* **2023**, *15*, 1913. [CrossRef]
98. Mouhebati, N. Analysis of visual impacts in compact city's form. *Int. J. Archit. Urban Dev.* **2012**, *2*, 51–56.
99. Asur, F.; Yazici, K. Observers' perceptions of aesthetic quality of high-ris e buildings in the urban landscape: The case of levent/istanbul. *Fresenius Environ. Bull.* **2020**, *29*, 11165–11174.
100. Lu, P.; Sani, N.M.; Li, Y.; Wang, Y. How does urban blue space affect human well-being? A study based on the stimulus-organism-response theory. *Front. Psychol.* **2025**, *16*, 1553296. [CrossRef]
101. Deng, C.; Shi, Z.; Zhang, Y.; Wang, J. Analysis of Green Travel Choice Behavior of Residents in Central Urban Areas: Applying the Theory of Planned Behavior and Stimulus–Organism–Response Model. *Sustainability* **2025**, *17*, 2208. [CrossRef]
102. Litman, T. Changing travel demand: Implications for transport planning. *Inst. Transp. Eng. ITE J.* **2006**, *76*, 27–33.
103. Subhaktiyasa, P.G. PLS-SEM for multivariate analysis: A practical guide to educational research using SmartPLS. *EduLine J. Educ. Learn. Innov.* **2024**, *4*, 353–365. [CrossRef]
104. Information, N.C.f.S.a. *Statistical Yearbook 2022: Muscat Governorate*; National Centre for Statistics and Information (NCSI) of Oman: Muscat, Oman, 2022.
105. Al Shueili, K. *Towards a Sustainable Urban Future in Oman: Problem and Process Analysis (Muscat as a Case Study)*; The Glasgow School of Art: Glasgow, UK, 2015.
106. Scholz, W.; Langer, S. *Spatial Development of Muscat/Oman and Challenges of Public Transport*; Future Cities Laboratory Singapore: Singapore; ETH Zürich: Zürich, Switzerland, 2019.
107. Ministry of Housing and Urban Planning. *Oman National Spatial Strategy: National Planning Standards*; Atkins; Oxford Economics: Muscat, Oman, 2023. Available online: https://www.housing.gov.om/cmsapi/files/content/Books_publication/ONSS%20National%20Planning%20Standards_August%202023_FINAL%20PDF_compressed.pdf (accessed on 10 May 2025).

108. Kline, R.B. *Principles and Practice of Structural Equation Modeling*, 5th ed.; Guilford Publications: New York, NY, USA, 2023.
109. Shrestha, N. Factor analysis as a tool for survey analysis. *Am. J. Appl. Math. Stat.* **2021**, *9*, 4–11. [CrossRef]
110. Costello, A.B.; Osborne, J. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Pract. Assess. Res. Eval.* **2005**, *10*, 7.
111. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis*; Cengage Learning: Boston, MA, USA, 2019.
112. Byrne, B.M. Structural equation modeling with AMOS, EQS, and LISREL: Comparative approaches to testing for the factorial validity of a measuring instrument. *Int. J. Test.* **2001**, *1*, 55–86. [CrossRef]
113. Aguirre-Urreta, M.I.; Hu, J. Detecting common method bias: Performance of the Harman's single-factor test. *ACM SIGMIS Database DATABASE Adv. Inf. Syst.* **2019**, *50*, 45–70. [CrossRef]
114. Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.-Y.; Podsakoff, N.P. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *J. Appl. Psychol.* **2003**, *88*, 879–903. [CrossRef] [PubMed]
115. Sarstedt, M.; Ringle, C.M.; Smith, D.; Reams, R.; Hair, J.F., Jr. Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *J. Fam. Bus. Strategy* **2014**, *5*, 105–115. [CrossRef]
116. Akter, S.; Fosso Wamba, S.; Dewan, S. Why PLS-SEM is suitable for complex modelling? An empirical illustration in big data analytics quality. *Prod. Plan. Control* **2017**, *28*, 1011–1021. [CrossRef]
117. Fornell, C.; Larcker, D.F. Evaluating structural equation models with unobservable variables and measurement error. *J. Mark. Res.* **1981**, *18*, 39–50. [CrossRef]
118. Henseler, J.; Ringle, C.M.; Sarstedt, M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* **2015**, *43*, 115–135. [CrossRef]
119. Cohen, J. *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed.; Routledge: London, UK, 1988.
120. Tenenhaus, M.; Vinzi, V.; Chatelin, Y.; Lauro, C. PLS Path Modeling. *Comput. Stat. Data Anal.* **2005**, *48*, 159–205. [CrossRef]
121. Wetzels, M.; Odekerken-Schröder, G.; Van Oppen, C. Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Q.* **2009**, *33*, 177–195. [CrossRef]
122. Didero, M.; Nebel, S.; Pfaffenbach, C. Urban structures and daily mobility patterns in a city of long distances—The case of Muscat/Oman. *Singap. J. Trop. Geogr.* **2019**, *40*, 361–386. [CrossRef]
123. Siqueira, G.d.; Adeel, A.; Pasha, P.; Balushi, A.A.; Shah, S.A.R. Sustainable transportation and policy development: A study for impact analysis of mobility patterns and neighborhood assessment of walking behavior. *Sustainability* **2021**, *13*, 1871. [CrossRef]
124. Peterson, J.E. Some Reflections on Social Change and Continuity in Oman and the Gulf. In Proceedings of the Third Symposium of the Sultan Qaboos Academic Chairs: Managing Water Resources for Sustainable Development, Tokyo, Japan, 2–3 October 2014.
125. Oldenburg, R. *The Great Good Place: Cafes, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community*; Da Capo Press: Cambridge, MA, USA, 1999.
126. UN-Habitat. *World Cities Report 2020—The Value of Sustainable Urbanization*; UN Habitat: Nairobi, Kenya, 2020.
127. Ameen, R.F.M.; Mourshed, M. Urban environmental challenges in developing countries—A stakeholder perspective. *Habitat Int.* **2017**, *64*, 1–10. [CrossRef]
128. Nebel, S. Tourism and Urbanization in Oman: Sustainable and Socially Inclusive? In *Under Construction: Logics of Urbanism in the Gulf Region*; Routledge: London, UK, 2016; pp. 55–70.
129. Sallam, I.; Abdelghani, M. Systemic approach to smart urban transformations of cities: Case of Muscat-Oman. *Int. J. Membr. Sci. Technol.* **2023**, *10*, 630–652. [CrossRef]