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Factors Affecting Urban Livability in Babol City with Emphasis on the Role of Urban Planning

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A B S T R A C T

The present study aimed to investigate and analyze the factors affecting urban livability in Babol City, with particular emphasis on the role of urban planning. Urban livability, as one of the key indicators for assessing quality of life and sustainable urban development, reflects the extent to which urban environments correspond to the human, economic, and social needs of citizens. In terms of purpose, this study was applied, and in terms of methodology, it employed a descriptive-analytical design with a quantitative approach. The statistical population consisted of citizens of Babol City. Using Cochran's formula, a sample size of 384 participants was determined, and the required data were collected using a standardized questionnaire based on a five-point Likert scale. Cronbach's alpha was used to assess the reliability of the instrument, while descriptive and inferential statistics, including Pearson's correlation coefficient and multiple regression analysis, were applied to analyze the data using SPSS software. The independent variables included income level, sense of place attachment, quality of public spaces, access to urban services, and urban land value, while urban livability was considered the dependent variable. The results indicated positive and statistically significant relationships between all independent variables and urban livability. The multiple regression model, with a coefficient of determination of 0.62, explained approximately 62% of the variance in urban livability. Among the predictors, urban services ($\beta = 0.41$) and sense of place attachment ($\beta = 0.35$) made the greatest contributions to predicting urban livability. Finally, based on the findings, practical recommendations were proposed to enhance livability within the urban management system of Babol.

Keywords: *urban livability, urban planning, Babol City, quality of life, urban services, sense of place attachment*

1. Introduction

Urban livability has emerged as one of the central concepts in contemporary urban planning and management because it provides a comprehensive framework for evaluating the extent to which cities are capable of meeting the everyday needs, expectations, and aspirations of their residents. Rapid urbanization, population concentration, changes in land-use patterns, environmental pressures, socioeconomic inequality, infrastructure deficiencies, and transformations in citizens' lifestyles have increasingly challenged the capacity of cities to provide safe, accessible, inclusive, and high-quality living environments. Within this context, livability extends beyond the physical quality of the built environment and encompasses interconnected social, economic, environmental, spatial, institutional, and perceptual dimensions. Consequently, improving urban livability has become an important objective of sustainable urban development policies, particularly in cities experiencing rapid physical expansion and increasing pressure on public services and urban infrastructure (Altani et al., 2019; Najafi et al., 2020; Nikpour & Yarahmadi, 2020).

The concept of urban livability is closely associated with quality of life, although the two concepts are not entirely synonymous. Quality of life generally refers to the broader level of individual and collective well-being, whereas urban livability focuses more specifically on the characteristics of urban environments that support satisfactory everyday life. These characteristics include access to essential services, environmental quality, housing conditions, economic opportunities, transportation, public safety, public spaces, social interaction, governance, and attachment to place. Therefore, livability can be understood as a multidimensional assessment of the relationship between residents and the urban environment in which they live. In this sense, a livable city is not merely one that possesses adequate infrastructure, but one in which physical, social, economic, and environmental systems function in an integrated manner to create favorable living conditions for diverse groups of citizens (Chen, 2023; Zhang et al., 2023).

Recent studies have increasingly emphasized that livability should be treated as a dynamic and context-dependent concept rather than a fixed set of universal indicators. The importance assigned to different aspects of livability may vary according to city size, demographic structure, socioeconomic conditions, climatic characteristics, urban morphology, cultural values, and institutional arrangements. For example, in metropolitan areas, accessibility, traffic congestion, housing costs, environmental pollution, and public transportation may receive greater attention, whereas in small and medium-sized cities, access to basic services, employment stability, neighborhood cohesion, public-space quality, and local identity may be particularly influential. Accordingly, empirical assessment of livability requires locally grounded indicators that reflect both general urban development principles and the specific characteristics of the study area (Amini et al., 2021; Nikpour & Yarahmadi, 2020; Parizadi et al., 2019).

Urban planning has a particularly important role in shaping livability because many of the determinants of everyday urban experience are directly or indirectly influenced by planning decisions. The spatial distribution of services, location of transportation infrastructure, provision of public spaces, regulation of land use, housing development, neighborhood design, environmental protection, density patterns, and distribution of urban facilities all affect residents' opportunities and constraints. Planning can therefore either reduce or intensify inequalities in access to urban resources. When services and amenities are concentrated in specific districts, residents of underserved neighborhoods may experience longer travel times, higher transportation costs, lower environmental quality, and reduced access to educational, recreational, healthcare, and administrative facilities. In contrast, balanced urban planning can improve spatial justice, accessibility, neighborhood functionality, and overall satisfaction with the urban environment (Pourahmad et al., 2020; Sajadzadeh & Hamidi, 2022).

One of the most influential dimensions of urban livability is access to urban services. The availability, quality, diversity, and spatial accessibility of services such as public transportation, healthcare facilities, educational institutions, recreational spaces, public utilities, commercial services, and municipal infrastructure directly affect residents' daily routines. Service accessibility is particularly important because citizens experience the city through repeated interactions with these facilities. Poorly distributed or inadequate services can generate spatial inequality and reduce satisfaction even when the city possesses relatively favorable economic or environmental conditions. Recent research on smart and sustainable cities has further demonstrated that the effective management of urban facilities and public spaces can substantially improve livability by enhancing accessibility, responsiveness,

efficiency, safety, and the quality of citizens' interactions with the urban environment (Abdelkarim et al., 2023; Ahmadi et al., 2024).

The increasing application of smart-city technologies has also expanded the discussion of urban livability. Smartification can improve the efficiency of municipal services, enhance urban security, optimize transportation systems, strengthen environmental monitoring, facilitate citizen participation, and support evidence-based planning. However, technological development alone does not automatically create a livable city. Its contribution depends on the extent to which technology is integrated with social inclusion, spatial justice, institutional capacity, and citizen-oriented planning. Research has shown that smart-city development may contribute to subjective well-being and urban livability when technological interventions respond to actual resident needs rather than functioning as isolated technical solutions (Ahmadi et al., 2024; Chen, 2023). Likewise, spatial analysis of Iranian cities suggests that the relationship between smart-city characteristics and livability is differentiated across neighborhoods, demonstrating the importance of spatially sensitive planning approaches (Hajarian, 2025).

Public spaces constitute another major component of urban livability. Streets, parks, plazas, pedestrian areas, and neighborhood gathering spaces perform functions that extend beyond physical circulation or recreation. Well-designed public spaces facilitate social interaction, promote physical activity, improve perceptions of safety, enhance neighborhood identity, and support informal economic and cultural activities. Characteristics such as accessibility, lighting, pedestrian orientation, urban furniture, visual quality, environmental comfort, and vitality can therefore significantly influence the way residents evaluate their city. Smart and sustainable public-space management has also been identified as an important mechanism for improving livability by creating environments that are accessible, adaptive, secure, and responsive to user needs (Abdelkarim et al., 2023). Similarly, studies focusing on compact urban development indicate that appropriately designed density, mixed land use, accessibility, and neighborhood-level interaction can strengthen both sustainability and livability when supported by adequate infrastructure and public-space quality (Sajadzadeh & Hamidi, 2022).

The physical structure and morphology of cities can also create substantial differences in livability. Uncontrolled urban sprawl, low-density development, automobile dependence, fragmented land use, and insufficient pedestrian connectivity may reduce accessibility and increase environmental and transportation burdens. Such patterns often lengthen travel distances, weaken neighborhood interaction, and increase dependence on private vehicles. Research on rapidly developing cities has highlighted how low-density expansion and car-oriented urban form can create significant challenges for achieving livable urban environments (Altani et al., 2019). Conversely, integrated land-use planning, compact development, pedestrian-friendly design, and balanced access to services can reduce travel burdens and support more sustainable forms of daily life (Sajadzadeh & Hamidi, 2022).

The environmental and ecological dimensions of livability are equally important. Urban residents are increasingly affected by environmental problems such as air pollution, inadequate green space, noise, heat stress, ecological degradation, poor drainage, and reduced environmental resilience. Ecological conditions influence both objective quality of the urban environment and citizens' subjective perceptions of comfort and well-being. Studies conducted in Tehran have shown that ecological foundations and environmental characteristics have meaningful effects on urban livability, reinforcing the need to integrate ecological considerations into urban development and land-use planning (Sasanpour & Hakimi, 2023). This perspective is particularly important in rapidly transforming urban areas where development pressures may lead to the loss of natural assets, deterioration of environmental quality, and increased exposure to environmental risks.

In addition to physical and environmental factors, the social dimension of livability is strongly associated with residents' relationship with their neighborhoods and city. Sense of place attachment reflects emotional bonds, identification, belonging, continuity, and social connection to a specific place. Residents who feel attached to their neighborhood are often more willing to remain in the area, participate in community activities, protect local resources, interact with neighbors, and contribute to neighborhood improvement. Place attachment can also strengthen perceived security and psychological comfort. Therefore, urban livability is not solely produced by material investments; it also depends on whether residents perceive the city as meaningful, familiar, secure, and socially supportive. Research on historical fabrics and neighborhood revitalization has demonstrated that strengthening local identity and preserving meaningful urban environments can enhance livability while supporting social continuity and community cohesion (Khaksar & Mahdavi, 2023).

The importance of social and spatial identity becomes especially apparent in older and central urban areas. These areas often possess strong cultural and historical value but may simultaneously face deteriorated infrastructure, inadequate services, environmental problems, aging buildings, and socioeconomic decline. Studies of old urban fabrics in Iranian cities have demonstrated that livability in such areas is shaped by the interaction of economic, social, environmental, and physical conditions (Najafi et al., 2020). Similarly, research on central neighborhoods has highlighted the importance of access, housing quality, environmental conditions, urban services, and social characteristics in shaping residents' assessment of their living environment (Parizadi et al., 2019). Revitalization policies that focus exclusively on physical renewal without considering residents' social bonds, affordability, and local identity may therefore fail to produce sustainable improvements in livability (Khaksar & Mahdavi, 2023).

Economic conditions constitute another fundamental dimension of urban livability. Household income affects the ability of residents to secure adequate housing, access transportation, use recreational and cultural facilities, obtain healthcare, and cope with increases in everyday living costs. Employment stability and purchasing power are similarly important because economic insecurity can diminish the benefits of physical or infrastructural improvements. At the urban level, rising land and housing values can have contradictory effects. Although increasing property values may indicate investment attractiveness and economic dynamism, excessive increases can reduce housing affordability, intensify residential displacement, and deepen socioeconomic segregation. Thus, the relationship between urban land value and livability cannot be interpreted solely in positive terms. Planning policies must balance investment incentives with affordability and social inclusion to prevent improvements in urban areas from excluding lower-income residents (Pourahmad et al., 2020; Zhang et al., 2023).

Urban governance also plays a decisive role in the production of livability. Effective governance influences transparency, participation, service delivery, accountability, resource allocation, infrastructure investment, environmental management, and responsiveness to citizen needs. The relationship between good urban governance and livability has been documented in Iranian urban studies, where stronger governance mechanisms have been associated with improved urban conditions and more equitable access to resources (Pourahmad et al., 2020). International research has similarly emphasized that governance deficiencies can undermine livability even when cities possess substantial economic and infrastructural resources. Objective assessments and expert evaluations of urban livability have demonstrated that governance challenges related to coordination, policy implementation, public participation, and distribution of services can limit improvements in urban quality of life (Zhang et al., 2023).

The increasing complexity of urban systems has also encouraged researchers to employ more integrated and predictive approaches to livability. Simulation-based research, for instance, has shown that residents' behavioral decisions and interactions with the urban environment can generate complex spatial patterns of livability over time. Multi-agent modeling of resident behavior has demonstrated that livability is not simply the outcome of static urban characteristics, but is continuously shaped by interactions among individuals, land uses, services, mobility patterns, and environmental conditions (Pan et al., 2020). This perspective underscores the importance of examining livability as a system of interdependent variables and supports the use of multivariate analytical methods capable of identifying the relative contribution of different determinants.

In the Iranian context, the study of urban livability has expanded considerably in recent years, reflecting concerns about uneven development, declining environmental quality, service inequalities, urban expansion, housing affordability, and changing social relationships. Research conducted in different cities has identified a broad range of determinants, including economic conditions, social cohesion, physical quality, environmental sustainability, accessibility, governance, urban services, and infrastructure (Amini et al., 2021; Najafi et al., 2020; Nikpour & Yarahmadi, 2020). Futures-oriented research has further suggested that the determinants of livability are likely to become more complex due to technological change, environmental pressures, demographic transformation, and evolving expectations of urban residents (Amini et al., 2021). These findings reinforce the need for city-specific empirical studies capable of identifying the most influential local factors rather than relying solely on generalized national or international frameworks.

Babol is one of the important urban centers of Mazandaran Province and has experienced significant demographic, physical, economic, and spatial transformations. The city's growing population, increasing demand for housing and services, traffic pressures, expansion of built-up areas, changes in land values, and

transformation of neighborhood structures have created new challenges for urban management and planning. Previous research has specifically examined livability indicators in Babol and its surrounding urban system. A study measuring livability indicators in Babol demonstrated that the city's livability conditions are multidimensional and spatially differentiated, requiring attention to socioeconomic, service, environmental, and physical characteristics (Bakhshi et al., 2022). Research on small cities within Babol County has similarly shown that livability indicators vary across settlements and that spatial inequalities influence residents' access to favorable urban conditions (Shokri Firouzjah et al., 2021). These studies provide an important empirical foundation but also indicate the need for more focused analysis of the relative effects of specific determinants within Babol City itself.

Despite the growing literature on urban livability, several analytical gaps remain relevant to Babol. First, many studies assess composite livability indices without clearly determining which specific variables have the strongest predictive influence on residents' overall evaluations. Second, research often treats physical, economic, and social components separately, whereas urban planning requires an integrated understanding of how different factors operate simultaneously. Third, the role of subjective factors such as sense of place attachment is sometimes underrepresented compared with more readily measurable indicators such as infrastructure and service access. Fourth, the interaction between economic variables, including household income and urban land value, and perceptual dimensions of livability requires greater attention, particularly in medium-sized cities where rapid changes in property markets may affect affordability and social stability. Finally, because urban livability is spatially and contextually dependent, findings from metropolitan areas cannot automatically be generalized to Babol (Bakhshi et al., 2022; Hajarian, 2025; Shokri Firouzjah et al., 2021).

Accordingly, an integrated assessment of urban services, sense of place attachment, quality of public spaces, household income, and urban land value can provide a more comprehensive explanation of the factors shaping livability in Babol. These variables represent interconnected dimensions of urban life that are also directly relevant to urban planning and municipal management. Urban services capture functional accessibility and infrastructure provision; sense of place attachment reflects social and psychological relationships with the city; public-space quality represents the experiential and physical dimension of everyday urban environments; household income captures residents' economic capacity; and urban land value reflects broader housing-market and affordability conditions. Examining these variables simultaneously through correlation and multiple regression analysis can therefore identify not only whether they are related to urban livability, but also their relative explanatory and predictive importance.

From a policy perspective, such evidence can support more targeted urban planning interventions. If service accessibility emerges as the dominant determinant, municipal investment should prioritize equitable distribution and efficiency of facilities. If place attachment has a strong influence, policies should strengthen neighborhood identity, social participation, continuity, and community-based planning. If public-space quality contributes substantially to livability, greater attention should be given to pedestrian environments, parks, lighting, urban furniture, safety, and vitality. Likewise, significant effects of income and land value would indicate the importance of affordability, socioeconomic inclusion, and housing-sensitive planning. In this way, empirical analysis of livability can move beyond descriptive assessment and contribute directly to urban decision-making, resource allocation, and long-term planning strategies.

Therefore, the aim of the present study is to investigate and analyze the effects of household income, sense of place attachment, quality of public spaces, urban services, and urban land value on urban livability in Babol City, with particular emphasis on the role of urban planning.

2. Methods and Materials

In terms of purpose, this study was applied, and in terms of methodology, it adopted a descriptive-analytical design with a quantitative approach.

The statistical population consisted of all citizens residing in different areas of Babol City. Using Cochran's formula at a 95% confidence level, the sample size was determined as 384 participants. The sample was distributed across different neighborhoods using multistage cluster sampling to ensure adequate geographical representation.

To ensure the adequacy and balanced distribution of the statistical sample (389 participants), the demographic characteristics obtained from the questionnaires were analyzed. The results showed that, in terms of gender, 52.4% of respondents were male and 47.6% were female. Regarding age distribution, the highest proportion belonged to the 30–45-year age group (41.2%). With respect to

educational attainment, 34.5% held a bachelor's degree, while 28.1% had seminary education or a master's degree, indicating that respondents were capable of understanding the specialized concepts included in the questionnaire. The distribution of monthly household income also showed that a larger proportion of respondents belonged to middle- and lower-income groups, consistent with the general socioeconomic structure of Babol City.

The principal data collection instrument was a questionnaire based on a five-point Likert scale, ranging from "strongly disagree" to "strongly agree," designed to assess the five dimensions of the independent variables as well as the dependent variable. The face and content validity of the questionnaire were confirmed through consultation with university faculty members and experts in urban planning. Its reliability was assessed using Cronbach's alpha, with an overall coefficient greater than 0.75. To ensure accurate measurement of the study variables, the researcher-developed questionnaire employed a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The variables, dimensions, number of items, representative items, and reliability coefficients are presented in Table 1.

Table 1

Operationalization of Variables: Dimensions and Measurement Items

Main Variable	Dimensions / Components	Number of Items	Example of Representative Items	Reliability Coefficient (Cronbach's α)
Urban services	Accessibility, diversity of services, infrastructure efficiency	6	Adequate access to public transportation, healthcare centers, and basic urban infrastructure within the neighborhood	0.81
Sense of place attachment	Neighborhood identity, emotional attachment, intention to remain	5	Pride in residing in Babol City and a sense of psychological security and connection with neighbors	0.79
Quality of public spaces	Vitality, legibility, lighting, pedestrian-friendliness	6	Availability of safe and vibrant pedestrian pathways and parks with adequate lighting and standard urban furniture	0.76
Household income	Financial adequacy, employment stability, property purchasing power	4	Adequacy of monthly household income relative to essential living and housing costs in Babol	0.88
Urban land value	Housing financial burden, investment potential, affordability/accessibility	4	Reasonableness of land and housing prices relative to household financial capacity for ownership or mortgage/leasehold arrangements	0.82
Urban livability (dependent variable)	Overall satisfaction, environmental safety, physical and environmental quality	7	Overall level of satisfaction with residential quality, environmental comfort, and everyday living standards	0.84

After being entered into SPSS, the collected data were analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation, and inferential statistics, including Pearson's correlation coefficient to examine the relationship between each independent variable and the dependent variable, as well as simultaneous multiple regression using the Enter method to determine the relative contribution of the independent variables to explaining urban livability. Before conducting the analyses, the normality of the distribution of the variables was assessed using the Kolmogorov-Smirnov test.

Prior to conducting correlation and regression analyses, the Kolmogorov-Smirnov test was used to assess the normality of the variable distributions. The results indicated that the significance levels (Sig.) for all study variables were greater than 0.05. Therefore, the assumption of normality was supported, permitting the use of parametric statistical tests, including Pearson's correlation and multiple regression analysis.

To assess the reliability of the data collection instrument, Cronbach's alpha coefficient was calculated as 0.84 for the entire questionnaire. The coefficients for the five dimensions were as follows: urban services (0.81), sense of place attachment (0.79), quality of public spaces (0.76), household income (0.88), and land value (0.82). All coefficients exceeded the standard threshold of 0.70, indicating satisfactory reliability of the research instrument. In addition, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.86, and Bartlett's test of sphericity was statistically significant ($p < .001$), confirming the suitability of the data matrix for factor analysis and regression analysis.

3. Findings and Results

The demographic characteristics of the respondents indicated an appropriate distribution in terms of age, gender, educational attainment, and income, thereby enhancing the validity of the findings. Table 2 presents the descriptive statistics for the main study variables based on scores ranging from 1 to 5.

Table 2

Descriptive Statistics of the Study Variables

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Household income	384	2.85	0.92	1.00	5.00
Sense of place attachment	384	3.42	0.78	1.20	5.00
Quality of public spaces	384	2.96	0.85	1.00	4.80
Urban services	384	3.18	0.81	1.20	5.00
Urban land value	384	3.65	0.88	1.50	5.00
Urban livability (dependent variable)	384	3.22	0.74	1.40	4.90

According to Table 1, the mean score for urban livability (3.22) was slightly higher than the theoretical midpoint of the scale (3), indicating a moderate level of urban livability in Babol City. The lowest mean scores were observed for household income (2.85) and quality of public spaces (2.96), making these two components the principal weaknesses affecting livability in Babol.

Pearson's correlation coefficient was used to examine the relationships between the independent variables and urban livability. The results are presented in Table 3.

Table 3

Pearson Correlations Between the Independent Variables and Urban Livability

Independent Variable	Correlation Coefficient (r)	Significance Level	Hypothesis Result
Income	0.42	$p < .001$	Positive and significant relationship supported
Sense of place attachment	0.68	$p < .001$	Strong and significant relationship supported
Quality of public spaces	0.59	$p < .001$	Positive and significant relationship supported
Urban services	0.74	$p < .001$	Direct and very strong relationship supported
Urban land value	0.38	$p < .05$	Positive and significant relationship supported

As shown in Table 2, all research hypotheses were supported at the 95% confidence level. The strongest correlation with urban livability was observed for urban services ($r = 0.74$), followed by sense of place attachment ($r = 0.68$). In other words, the more positively citizens evaluated their access to urban services and the stronger their emotional connection to their place of residence, the higher they perceived the city's livability to be. The lower correlation observed for land value ($r = 0.38$) indicates that a booming land market does not necessarily lead to an improvement in quality of life and may even threaten urban livability through the economic displacement of lower-income groups.

To ensure the validity and generalizability of the results obtained from the multiple linear regression analysis, its fundamental assumptions were carefully examined.

1. Independence of errors (Durbin-Watson test): The Durbin-Watson statistic was 1.91. Because this value falls within the acceptable range of 1.5 to 2.5, the assumption of independence of residuals and the absence of autocorrelation was supported.

2. Absence of multicollinearity: To assess potential overlap among the independent variables, tolerance values and variance inflation factor (VIF) indices were calculated. The results showed that tolerance values for all variables were greater than 0.20, ranging from 0.41 to 0.78, while VIF values for all independent variables were below 5, ranging from 1.28 to 2.41. Therefore, no problematic multicollinearity was detected that could prevent accurate estimation of the unique contribution of each variable to the regression model. Accordingly, the standardized beta coefficients (β) can be considered statistically reliable.

To determine the relative contribution of each independent variable to predicting changes in urban livability, a simultaneous multiple regression model using the Enter method was estimated. The overall model results are presented in Table 4.

Table 4

Overall Results of the Multiple Regression Model

Model	Correlation Coefficient (R)	Coefficient of Determination (R^2)	Adjusted R^2	F Statistic	Significance Level
1	0.79	0.62	0.61	51.84	$p < .001$

The coefficient of determination ($R^2 = 0.62$) indicates that approximately 62% of the variance in urban livability in Babol City is explained by the independent variables included in the study, while the remaining variance is attributable to factors outside the model, such as specific individual and perceptual characteristics. The standardized regression coefficients (beta coefficients) are presented in Table 5.

Table 5

Regression Coefficients of the Independent Variables

Independent Variable	Standardized Beta (β)	t Value	Significance Level	Rank of Importance
Urban services	0.41	7.25	$p < .001$	1
Sense of place attachment	0.35	6.10	$p < .001$	2
Quality of public spaces	0.24	3.90	$p = .001$	3
Income	0.18	2.65	$p = .008$	4
Urban land value	0.15	2.10	$p = .035$	5

The results presented in Table 4 indicate that urban services ($\beta = 0.41$) and sense of place attachment ($\beta = 0.35$) were the strongest predictors of urban livability in Babol City. Collectively, the first three variables accounted for the largest proportion of the model's explanatory power. This finding provides a clear direction for urban policy-making: investment in the equitable distribution of urban services, improvement of public spaces, and strengthening of neighborhood-level social ties constitute the principal policy levers for enhancing urban livability in Babol.

4. Discussion and Conclusion

The present study investigated the factors affecting urban livability in Babol City, with particular emphasis on the role of urban planning. The findings demonstrated that all five examined variables—urban services, sense of place attachment, quality of public spaces, household income, and urban land value—were positively and significantly associated with urban livability. The multiple regression model explained 62% of the variance in urban livability, indicating that the selected variables collectively provide substantial explanatory power for understanding residents' perceptions of livability in Babol. Among the predictors, urban services emerged as the strongest factor, followed by sense of place attachment, quality of public spaces, household income, and urban land value. These findings reinforce the multidimensional nature of livability and indicate that both objective characteristics of the urban environment and subjective evaluations of place contribute to residents' overall assessment of urban living conditions.

The strongest relationship identified in the study was between urban services and urban livability. Urban services showed both the highest bivariate correlation with livability ($r = 0.74$) and the strongest standardized regression coefficient ($\beta = 0.41$). This finding suggests that residents' evaluations of access to transportation, healthcare, infrastructure, and other essential urban facilities play a central role in shaping their perceptions of the city as a suitable place to live. From an urban planning perspective, this result is particularly important because access to services is one of the dimensions most directly influenced by spatial planning, municipal investment, and infrastructure policy. When public services are distributed equitably, efficiently, and in accordance with population needs, residents experience lower accessibility barriers and greater satisfaction with everyday urban life. This interpretation is consistent with research emphasizing the importance of effective urban facility management and smart public-space provision in improving livability in sustainable cities (Abdelkarim et al., 2023). It is also aligned with evidence indicating that smartification and improved management of urban systems can enhance both security and livability by increasing service responsiveness, efficiency, and accessibility (Ahmadi et al., 2024).

The importance of urban services also corresponds with earlier research conducted in Iranian cities. Studies assessing urban livability have frequently demonstrated that service provision, accessibility, infrastructure quality, and spatial equity are among the most influential dimensions of livable urban environments (Najafi et al., 2020; Nikpour & Yarahmadi, 2020). In Babol specifically, previous research has shown that livability indicators differ across the urban space and that service-related inequalities contribute to variations in the quality of urban living conditions (Bakhshi et al., 2022). Similarly, research examining small cities in Babol County has identified spatial disparities in livability indicators, indicating that the equitable distribution of services remains a fundamental challenge at both city and county levels (Shokri Firouzjah et al., 2021). Therefore, the strong predictive effect of urban services in the current study can be interpreted as evidence that residents evaluate livability largely through the practical performance of the city in meeting their daily needs.

Sense of place attachment was the second strongest predictor of urban livability, with a correlation coefficient of 0.68 and a standardized regression coefficient of $\beta = 0.35$. This result indicates that livability is not merely a consequence of objective infrastructure and material conditions; it is also strongly dependent on residents' emotional, symbolic, and social relationships with their place of residence. Citizens who feel proud of living in Babol, perceive social connection with neighbors, experience psychological security, and intend to remain in their neighborhoods are more likely to evaluate their city positively. This finding highlights the importance of social identity, neighborhood continuity, and place-based meaning in urban planning. It suggests that planning strategies that focus exclusively on physical development without considering residents' emotional and cultural relationships with place may fail to generate meaningful improvements in perceived livability.

The positive contribution of place attachment is consistent with research on the revitalization of historical and established urban fabrics, where preservation of local identity, social continuity, and community attachment has been identified as an important component of livability improvement (Khaksar & Mahdavi, 2023). Studies of old and central urban neighborhoods likewise show that livability emerges from the interaction of physical, economic, environmental, and social conditions rather than from physical upgrading alone (Najafi et al., 2020; Parizadi et al., 2019). The present finding therefore supports a broader interpretation of livability in which social cohesion and attachment to place act as mediating resources through which residents experience and evaluate the urban environment. It also complements futures-oriented research suggesting that social identity, participation, and evolving resident expectations will remain important components of future urban livability (Amini et al., 2021).

The quality of public spaces constituted the third most influential predictor of urban livability, with a correlation of 0.59 and a standardized coefficient of $\beta = 0.24$. Although its effect was weaker than that of urban services and place attachment, it remained statistically significant and substantively meaningful. This finding indicates that the presence of safe, accessible, well-lit, pedestrian-friendly, and vibrant public spaces contributes directly to residents' perceptions of urban quality. Public spaces function as arenas for movement, social interaction, recreation, leisure, and community formation; therefore, their physical and functional quality affects both the environmental and social dimensions of livability. The relatively low mean score for public-space quality observed in this study also suggests that this dimension represents an area of relative weakness in Babol and should be treated as a priority for urban improvement.

This result is supported by previous research emphasizing the central role of public spaces in sustainable and livable cities. Smart public spaces have been shown to improve livability by integrating accessibility, facility management, safety, social interaction, and responsiveness to citizen needs (Abdelkarim et al., 2023). Similarly, studies of compact urban development suggest that pedestrian-oriented environments, mixed uses, appropriate density, and accessible public spaces can strengthen both sustainability and livability when adequately planned and managed (Sajadzadeh & Hamidi, 2022). The finding is also compatible with research showing that urban form can negatively affect livability when cities become excessively dispersed, automobile-dependent, and spatially fragmented (Altani et al., 2019). In Babol, improving public spaces may therefore contribute not only to environmental quality but also to social interaction, mobility, safety, and neighborhood-level identity.

Household income was also positively associated with urban livability, although its relative predictive contribution was smaller than that of urban services, place attachment, and public-space quality. The observed correlation of 0.42 and standardized regression coefficient of $\beta = 0.18$ indicate that higher household income is associated with more

favorable evaluations of urban living conditions. This relationship is understandable because income influences residents' ability to access appropriate housing, transportation, healthcare, leisure activities, consumer services, and other resources that contribute to everyday quality of life. Economic security may also reduce vulnerability to housing and living-cost pressures, thereby improving subjective well-being and satisfaction with the urban environment.

The importance of economic conditions has been repeatedly documented in urban livability research. Assessments of older urban fabrics in Iranian cities have identified economic capacity alongside social, environmental, and physical characteristics as a key determinant of residents' living conditions (Najafi et al., 2020). Similarly, studies of urban livability in smaller Iranian cities have emphasized employment, purchasing power, economic stability, and household resources as important components of perceived livability (Nikpour & Yarahmadi, 2020). The present finding is also consistent with broader evidence showing that urban livability is linked to subjective well-being and that economic conditions interact with environmental and urban-service characteristics in shaping citizens' evaluations of their city (Chen, 2023). Nevertheless, the relatively smaller standardized coefficient for income suggests that improvements in livability cannot be achieved solely through economic advancement and that public planning interventions remain essential.

Urban land value showed the weakest, although still significant, relationship with urban livability ($r = 0.38$, $\beta = 0.15$). This finding deserves careful interpretation because urban land value can have both beneficial and adverse implications for residents. Higher land values may reflect increased attractiveness, investment potential, infrastructure quality, and demand for particular urban areas. However, rising land and housing prices can also reduce affordability, create financial burdens, and contribute to socioeconomic displacement. Therefore, the positive relationship found in this study should not be interpreted as evidence that higher land prices necessarily enhance livability. Rather, it may indicate that areas with higher land values also tend to have better accessibility, services, infrastructure, or locational advantages. At the same time, the relatively weak predictive contribution of this variable suggests that the economic value of urban land alone is insufficient to generate a livable environment.

This interpretation aligns with studies that emphasize the complexity of spatial and governance-related determinants of livability. Livability is shaped not only by market values but also by the way urban resources, infrastructure, and opportunities are distributed across neighborhoods (Pourahmad et al., 2020). Governance challenges related to service distribution, policy coordination, and spatial inequality may weaken the benefits associated with urban investment and property-market growth (Zhang et al., 2023). Therefore, urban planning should avoid equating increasing land value with improvements in quality of life and should instead consider affordability, inclusion, displacement risks, and equitable access to urban opportunities.

The overall explanatory power of the regression model is another significant finding. The model accounted for 62% of the variance in urban livability, which indicates that the selected variables capture a substantial proportion of the factors underlying residents' evaluations of Babol. This relatively high explanatory power supports the integrated conceptualization of livability adopted in the study. Rather than being determined by a single dimension, urban livability appears to result from the cumulative effects of service accessibility, social attachment, public-space quality, economic capacity, and urban land conditions. This finding is consistent with studies that conceptualize livability as a multidimensional construct involving interdependent physical, social, economic, environmental, and governance-related components (Amini et al., 2021; Nikpour & Yarahmadi, 2020).

The multidimensional interpretation is also supported by simulation and systems-oriented approaches to urban livability. Research using multi-agent modeling has shown that residents' behavior, spatial patterns, accessibility, and urban conditions interact dynamically to produce variations in livability over time (Pan et al., 2020). This perspective is especially relevant to Babol because changes in urban services, land values, neighborhood structure, and social relations are unlikely to operate independently. Improvements in public transportation, for example, may increase accessibility to services, affect property values, and influence satisfaction with neighborhoods simultaneously. Consequently, urban planning strategies should be designed through integrated rather than sectoral interventions.

The findings are further compatible with research on smart-city development, which emphasizes that technological innovation contributes to livability only when integrated with human-centered planning, equitable service provision, and improved quality of urban life. Evidence from

Iranian cities has demonstrated spatial relationships between smart-city characteristics and livability, indicating that technological advancement can support better urban conditions when distributed effectively across neighborhoods (Hajarian, 2025). International research has similarly argued that smart-city initiatives are more likely to enhance happiness and sustainable urban development when they improve subjective well-being and respond to citizens' real needs (Chen, 2023). Therefore, Babol's future planning policies could benefit from smart-management tools, but such technologies should be used as instruments for improving accessibility, service quality, public-space management, and participation rather than being treated as objectives in themselves.

The findings also underscore the role of urban governance. Although governance was not directly included as an independent variable in the current model, several of the significant predictors—particularly urban services, public-space quality, and land management—are strongly dependent on governance capacity. Previous research has demonstrated that good urban governance is closely associated with livability through its influence on participation, accountability, infrastructure investment, service provision, and spatial justice (Pourahmad et al., 2020). Similarly, objective and expert assessments of livability have shown that governance deficiencies can prevent improvements in quality of life even in areas with substantial physical and economic resources (Zhang et al., 2023). The high importance of urban services in the present study may therefore partly reflect the broader quality of municipal governance experienced by residents in their daily lives.

The results regarding Babol are also broadly consistent with earlier research conducted in the city and surrounding areas. Previous assessment of livability indicators in Babol revealed substantial variation across dimensions and emphasized the importance of service, socioeconomic, and environmental factors (Bakhshi et al., 2022). Research on the smaller cities of Babol County likewise showed that livability is spatially differentiated and that some settlements perform better than others in terms of access to urban opportunities and quality of living conditions (Shokri Firouzjah et al., 2021). The current study extends this literature by identifying the relative statistical contribution of specific predictors and demonstrating that urban services and place attachment are particularly influential. In this respect, the findings provide a more targeted basis for urban management priorities.

The role of ecological and environmental considerations should also be acknowledged when interpreting the findings, even though ecological variables were not directly included in the regression model. Research has shown that ecological foundations significantly shape urban livability and that environmental quality should be integrated into planning frameworks alongside physical and social indicators (Sasanpour & Hakimi, 2023). In the context of Babol, where urban development is embedded within the environmentally sensitive landscape of northern Iran, ecological quality may interact with public-space conditions, service infrastructure, and urban expansion. Future livability strategies should therefore recognize the connections between the built environment, environmental resilience, and residents' everyday experiences.

Overall, the findings demonstrate that the livability of Babol is primarily shaped by the quality and accessibility of urban services, followed by residents' emotional and social attachment to place and the quality of public spaces. Economic variables also contribute, but their influence appears to be more limited than that of urban planning and neighborhood-level conditions. This pattern reinforces the argument that livability is not simply a reflection of household wealth or property-market performance; rather, it is substantially produced through the spatial organization, management, and social experience of the city. Accordingly, improving livability requires coordinated interventions that simultaneously address service equity, neighborhood identity, public-space quality, accessibility, and socioeconomic inclusion.

A number of limitations should be considered when interpreting the findings. First, the cross-sectional design limits the possibility of drawing causal conclusions because the relationships among the variables were measured at a single point in time. Second, the use of self-reported questionnaire data may have introduced response bias, common-method variance, and differences in individual perception. Third, although the selected variables explained a substantial proportion of the variance in livability, other potentially important determinants, such as environmental quality, traffic congestion, housing quality, neighborhood safety, governance performance, social capital, digital accessibility, and urban resilience, were not directly included in the model. Fourth, the study was limited to Babol City, and the findings may not be fully generalizable to cities with substantially different demographic, spatial, socioeconomic, or environmental characteristics. Finally, differences between neighborhoods were not modeled

separately, and therefore possible intra-urban spatial inequalities may not have been fully captured.

Future research should employ longitudinal and comparative designs to determine how livability changes over time and how its determinants differ across cities and neighborhoods. Researchers could integrate objective spatial indicators with residents' subjective evaluations by combining survey data with geographic information systems, land-use data, accessibility analysis, environmental measurements, and neighborhood-level socioeconomic indicators. Multilevel modeling could be used to distinguish individual-level and neighborhood-level effects, while structural equation modeling could examine indirect relationships among urban services, place attachment, public-space quality, satisfaction, and overall livability. Future studies should also incorporate variables such as environmental quality, housing affordability, governance, safety, walkability, social capital, smart-city readiness, traffic conditions, and climate resilience. Comparative research across different districts of Babol and other medium-sized Iranian cities would be especially useful for identifying whether the determinants observed in this study remain stable across different urban contexts.

From a practical perspective, urban managers in Babol should prioritize the equitable distribution, accessibility, and quality of basic urban services, particularly public transportation, healthcare facilities, neighborhood infrastructure, recreational services, and municipal amenities. Planning interventions should also improve pedestrian environments, neighborhood parks, lighting, urban furniture, safety, and the vitality of public spaces. Because sense of place attachment emerged as one of the strongest predictors, urban renewal projects should preserve neighborhood identity, encourage resident participation, strengthen community interaction, and avoid development strategies that unnecessarily disrupt established social networks. Housing and land-use policies should also consider affordability and the risk of displacement associated with increasing property values. More generally, livability indicators should be incorporated into routine municipal monitoring and planning so that urban investments can be evaluated not only in terms of physical development, but also according to their contribution to residents' everyday quality of life.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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