



Advances in Engineering and Technology

An International Journal

Liveability of Kathmandu's Traditional Neighbourhood: A Case of Te Bahal

Yaju Tuladhar ¹, Inu Pradhan Salike ^{1*}

¹ Department of Architecture, Pulchowk Campus, Institute of Engineering, TU, Lalitpur, Nepal

* Corresponding Author: inupradhan@ioe.edu.np

Abstract

The study investigates neighbourhood liveability and its contextual factors in case of Kathmandu's traditional neighbourhood of Te Bahal. A mixed-methods approach was applied in two phases. First phase involved thematic analysis of qualitative interviews and pattern matching was conducted in NVivo to identify contextually relevant themes. The main theme was identified as problem of accessibility and mobility in open bahal space. Access to open space, walkability, and parking pressure were found to be affecting factors to accessibility. In second phase, quantitative survey was conducted in four-point Likert scale and administered using KoboToolbox to assess the perceived importance and satisfaction of factors affecting the main theme. Data was processed in SPSS and analysed using mean scores, and gap analysis. Internal reliability was tested with Cronbach's alpha. Findings indicated that residents valued walkability, (absence of) parking pressure, and access to open spaces as mostly important for liveability of Te Bahal. Mean satisfaction ratings were lower than mean importance ratings, so all factors showed positive gap. Particularly, the satisfaction response had large standard deviation. The study speculates trade-offs between different liveability factors by residents and recommends possible exploration of liveability factors that carry different weights among a larger and diverse population size.

Keywords: *Liveability; Neighbourhood; Kathmandu; open space; accessibility; parking pressure*

1. Introduction

In the traditional urban areas of Kathmandu, the buildings and building layouts are the centuries old heritage of traditional Newari culture, but today, the context in which they were originally laid out has changed drastically in terms of lifestyle and infrastructure due to various phenomenon like population growth, urbanisation, and dense redevelopment. This raises critical question about current liveability in these traditional urban neighbourhoods. Researchers Kovacs-Györi et al. [1] and Lau & Hashim [2] use liveability to link urban planning and design to residents' everyday well-being, making it a critical tool for guiding human-centred urban development.

Researches show that liveability is revealed through residents' subjective preferences and everyday experiences, particularly at the neighbourhood level [1], [2]. This study focuses on the urban neighbourhood of Te Bahal. It is one of the oldest neighbourhood, which has seen many changes since its culturally significant history of being a monastery complex to now, a contemporary residential neighbourhood with many commercial and socio-cultural activities as well. The objective of this study is to identify and examine key factors that influence liveability in the neighbourhood of Te Bahal.

Liveability is used in various disciplines like ecology, geography, sociology, and urban planning, but there has not been an agreement across these disciplines concerning the dimensions that can fully capture the concept [2]. But liveability has been assessed in an urban scale, through a wide range of categories/parameters. Tennakoon and Kulatunga [3] also examined a number of categories from various sources and recognized categories like stability, culture, healthcare, education and infrastructure as key determinants of liveability. Chen and Dietrich [4] also involved urban categories like open space and density while Lau and Hashim [2] also assessed neighbourhood liveability through community life, environment quality, accessibility, employment, and safety.

Liveability definitions are often based on how an environment satisfy people's needs. Like, according to Kovacs-Györi et al. [1], the more needs a place can "effectively" satisfy, the more 'liveable' it is. While residents' needs are central to defining liveability, this approach assumes a very large range of human needs to be satisfied. When in fact, liveability has to do with immediate needs decided by the residents themselves. So an alternative and more pragmatic lens is taken in this study by undertaking liveability according to Capitanio [5], as "the alignment between the desired and actual living environment aiming at the betterment of the community as a whole."

2. Research Methodology

This study considers that liveability is shaped by local experiences, and epistemology involves knowledge on liveability obtained from literature and subjective experiences of people. This study adopted a mixed-methods approach in the neighbourhood of Te Bahal, Kathmandu. This study was conducted in two phases.

First phase focused on identifying key themes emerging from residents' perceptions by thematic analysis of open-ended interviews. This involved inductive open coding of the interview in NVivo to identify emerging issues and themes, followed by deductive categorisation of these codes according to residents' perception towards the current condition of these issues into three categories: 'desire', 'satisfaction' and 'problem'. These categories helped to operationalize the adopted definition of liveability by comparing desired and actual condition. The 'desire' category identified areas of residents' expectation for betterment of the community, the 'satisfaction' category revealed areas of alignment between desired and actual condition, and the 'problem' category highlighted areas of misalignment between desired and actual condition.

The main theme was identified through the analysis of frequent co-occurrences across codes, where higher co-occurrence was interpreted as an indicator of thematic importance. Theoretically grounded factors and indicators that align with the main theme were identified.

The second phase focused on field observation, testing the relevance of these factors, and assessment of alignment between desired and actual condition of these factors to reveal condition of the main theme. This was done through two methods that are widely used in liveability studies: mean score analysis and gap analysis of importance and satisfaction ratings.

Lau and Hashim [2] applied a quantitative scale where respondents were asked to express the importance of indicators on a five-point Likert style response scale i.e., 1 for “unimportant” and 5 for “very important”. Siagian et al. [6] and Purnawan et al. [7] evaluated gap analysis to compare residents’ assessment of satisfaction and expectations determined by the residents themselves. The gap were calculated by finding the mean importance score (MIS) and mean satisfaction score (MSS) on each criteria of liveability.

Structured questionnaire survey was prepared and administered using KoboToolbox and statistically analysed in SPSS. The study adopted a non-probability, purposive sampling approach. The purposive sampling focused on neighbourhood residents and respondents were selected on the basis of them being current residents of Te Bahal, ensuring that respondents had direct experience and familiarity with the local living conditions. A total of 22 responses were collected and the final dataset was imported into SPSS for analysis.

The questions were formulated using a quantitative scale with which the respondents were asked to express the importance and satisfaction of these indicators under each of dimension on a four-point Likert scale. Since the factors were selected based on relevance from the resident’s input, the scale of ‘not important’ was eliminated. Hence, the residents expressed the extent of importance. Descriptive mean analysis was carried out for the 4-point Likert scale data, for which, the ordinal scale was assigned numeric values as shown in Table 1.

Table 1: Assignment of numeric value to Likert scale

Criteria	Likert scale	Numeric value
Importance Rating	Very important	4
	Mostly important	3
	Somewhat important	2
	Less important	1
Satisfaction Rating	Very satisfied	4
	Mostly satisfied	3
	Somewhat satisfied	2
	Less satisfied	1

The relevance was tested by mean analysis of importance. As Lau and Hashim [2] emphasised, it is understood that as the mean value increases, the importance of the particular factor increases.

Gap analysis was done by calculating the difference between the importance and satisfaction mean scores for each indicator as shown below.

$$\text{Gap} = \text{mean importance score (MIS)} - \text{mean satisfaction score (MSS)}$$

According to Siagian et al. [6], larger gaps indicated higher priority areas for improvement, since they showed strong resident expectations but weak actual conditions.

Table 2: Gap analysis interpretation

Gap result	Condition	Interpretation
Positive gap	MIS > MSS (misalignment)	higher priority areas for improvement
Zero gap	MIS = MSS (alignment)	liveable condition
Negative gap	MIS < MSS (misalignment)	low priority area

Internal reliability was conducted through Cronbach's alpha coefficient values for importance and satisfaction using SPSS. Generally, value greater than or equal to 0.7 suggests good reliability in the data [2]. Ahmad et al. [8] report the formula for Cronbach's alpha as:

$$\alpha = \frac{N\bar{c}}{\bar{v} + (N - 1)\bar{c}}$$

Where, N = number of items (question), $\bar{c}$ = mean covariance between items, and $\bar{v}$ = mean item variance.

3. Study Area

Te Bahal is one of the oldest and culturally significant monastery complex in Kathmandu. It is located at the fringe of the traditional town of Kathmandu, adjacent to the contemporary commercial markets and is the home of the divine *Sankata* temple, where devotees visit regularly. It is composed of one of the biggest traditional courtyard (about 80m x 50m). About 50 buildings, excluding community building and dyochhen enclose the perimeter of the bahal. The no. of floor ranged from four to nine. Many of these buildings house shops and commercial activities in the lower levels while residents reside in the upper levels.

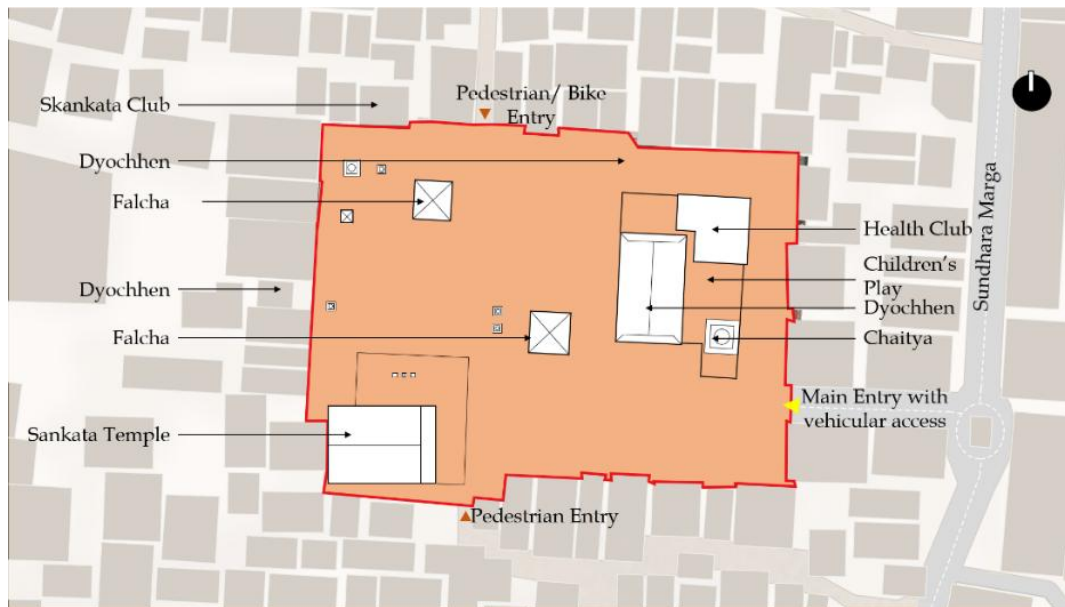


Figure 1: Layout of Te Bahal (not to scale)

4. Results and discussions

The first phase thematic analysis revealed particularly significant resident-reported issues: traffic congestion, and open space use conflict. The co-occurrence matrix B in Figure 2 highlights critical issues and themes by showing how residents linked particular codes with either 'desires', 'satisfactions', or 'problems'.

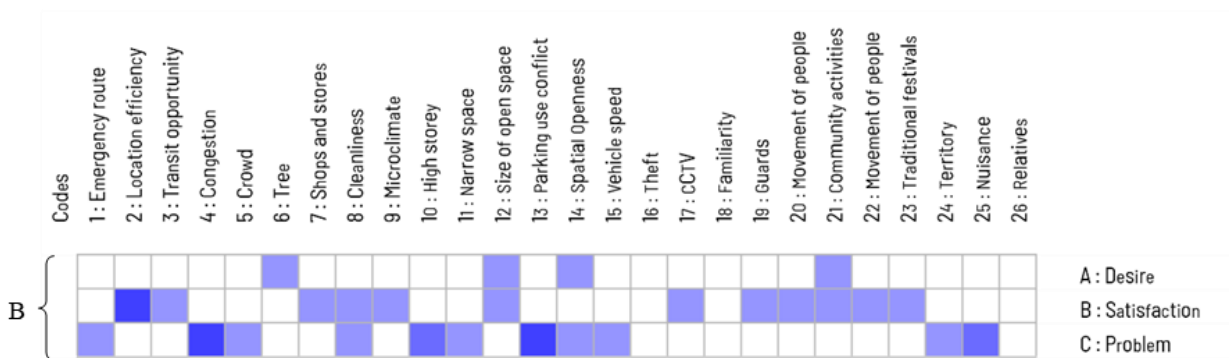


Figure 2: Matrix showing co-occurrence of residents' code in (B) with perception codes

Darker shades in the matrix indicate higher co-occurrence frequency across codes. The matrix reveals that residents are more frequently concerned with congestion (see Figure 2 code 4) and parking use conflict (see Figure 2 code 13). Residents consistently reported a prominent problem in accessibility of the open space due to hindrance of movement caused by movement of vehicles and congestion of parked vehicles. This also raised a conflict of use of the shared open space between vehicle parking and other social activities like children's play, socio-cultural gathering, etc. for the residents.

The open space categories were found to be one of the most prominently discussed in both between lived experience of residents and theoretically established liveability categories including in research by Chen and Dietrich [4], Gocer et al. [9], Kovacs-Györi et al.[1], Lau and Hashim [2] and Tennakoon and Kulatunga [3].

Tennakoon and Kulatunga [3] also discussed similar problem of potential conflict or overuse of open space was also discussed by liveability researchers. According to Nepal and Lal [10], walkability due to traffic flow is regarded as the safety factor for accessibility. Wiersma and Bertolini [11] also identified the pressure of residential parking in relatively compact urban neighbourhoods as growing and threatening the liveability of the streets. Islam et al. [12] emphasise ease of access of the available open space as another factor serving liveability aspects of urban life. Thus, this premise was further explored with the central theme accessibility and mobility with walkability, parking pressure, and access to open space as factors influencing accessibility of the bahal space, as shown in Figure 3.

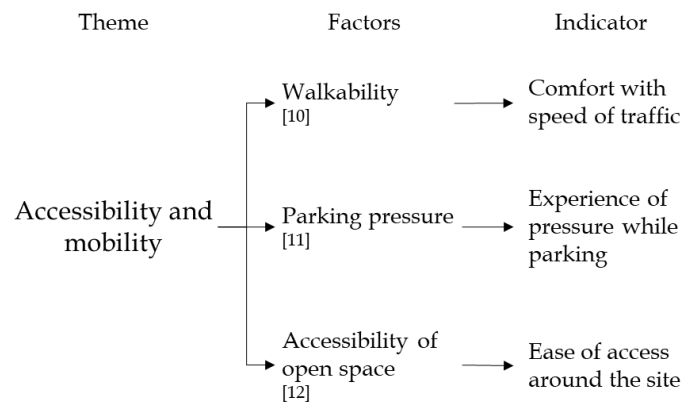


Figure 3: Framework showing central theme and factors and indicators

Field observations revealed that the central open space was regularly used for vehicle parking by residents, as well as outside public. Approximately 50% of the bahal space was found to be accessible after deducting substantially large built forms and parking space for bike, scooter, car, or van during most of the days except on special culturally significant occasions like on Saturdays when devotees arrive in large number to visit the temple, or *jatras* and festivals. On these days, strict management prohibits public parking inside the bahal, allowing only vehicles of residents to enter.

The mean importance and satisfaction ratings of the factors showed that all the factors scored a mean importance of above 3 out of 4 and mean satisfaction of above 2 out of 4. This reveals that most respondents identified the factors as 'mostly important' for liveability, but most respondents are only 'somewhat' satisfied with the present conditions. Access to open space and walkability were identified as important factors with comparatively less standard deviation, which reveals more harmonised view among the residents. In contrast, residents expressed diverse views regarding importance of absence of parking pressure as it revealed high standard deviation as shown in Table 3.

Table 3: Descriptive Statistics of mean Importance and mean Satisfaction of Factors

	Factor	Mean	SD
Importance	Access to the open space	3.59	0.67
	Walkability	3.36	0.58
	(Absence of) Parking pressure	3.27	0.83
Satisfaction	Access to the open space	2.41	0.91
	Walkability	2.59	0.80
	(Absence of) Parking pressure	2.59	0.91

Similarly, in terms of satisfaction, the overall satisfaction of the factors scored a lower mean than importance, but the standard deviation of all satisfaction scores are high. It suggest that some respondent experienced greater satisfaction than the others. Overall, residents agree on the importance of factors for accessibility (desire) more harmoniously, but highly differ in satisfaction of how those needs are met (actual conditions). In the gap analysis, all the factors showed positive gap as shown in Table 4, which indicated that improvement of conditions are necessary to meet liveability. Access to the open space was found to have the biggest gap of 1.18, while walkability and parking pressure were found to have gap of 0.77 and 0.68 respectively.

Table 4: Gap computation

Factor	Gap computation
Access to the open space	1.18
Walkability	0.77
(Absence of) Parking pressure	0.68

Cronbach's alpha coefficients (α) were found to be 0.637 for satisfaction of factors and 0.610 for importance of factors. The alpha value should be at 0.7 to indicate the scale reliability, hence the computed values are below the conventional threshold for acceptable reliability. However, this lower value may be attributed to the small number of sample and the limited number of constructs (3 each).

The high difference in the satisfaction scores and the importance scores among the residents suggests that further study is required to identify the specific reason for these differences. For example, most respondents reported that they parked their vehicle in the bahal, but those who reported 'somewhat' satisfaction or 'mostly' agree with having parking pressure are those who park in the bahal as shown in Figure 4 as well.

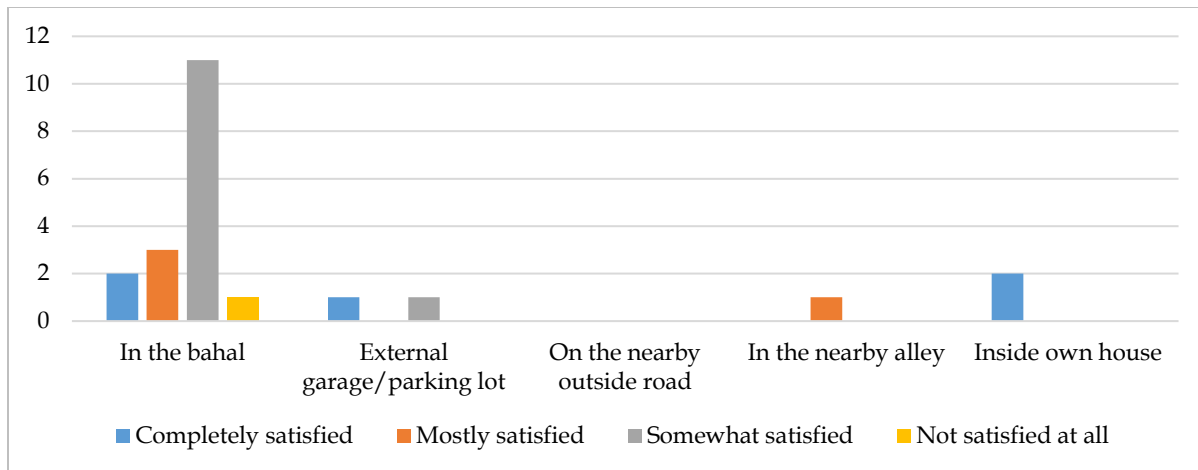


Figure 4: Chart showing cross tabulation between parking location and parking relief

Although less in number, those who reported parking somewhere else reported of ‘mostly’ or ‘very’ satisfaction. Therefore, residents who park in the bahal tend to feel more pressure, showing gap in liveability due to parking pressure. This also reflects the contest in the use of open bahal space.

Similarly, the higher gap between importance and satisfaction for access to open bahal space and walkability in the bahal can be further explored to identify the necessary improvements required to align desired and actual living environment, and enhance liveability of the neighbourhood.

5. Conclusions

To conclude, the liveability of Te Bahal, a traditional neighbourhood in Kathmandu city, was examined through a mixed method approach. Key factors for the context of Te Bahal were identified through pattern matching and a key theme was selected for further exploration through quantitative methods. Residents reported significance of access to open space, walkability, and the absence of parking pressure to have influence on Te Bahal’s liveability. Although importance ratings were uniformly high, satisfaction scores were much lower, resulting in positive gaps for all dimensions. Access to open space, in particular, showed need of improvement. This highlights the conflict occurring between its socio-cultural role and its debated use for parking. Interviewers maintained that despite these challenges, residents see their neighbourhood as liveable. This could suggest trade-offs and compromises between different liveability factors, and expands possible exploration of liveability factors that carry different weights. Since the study has a small sample size, it is recommended that further research with a larger and more diverse group of residents is needed to confirm and expand the findings. Also, further exploring combining residents’ perception in detail with objective data could help identify the reason for variation in response, especially for satisfaction. This can help policymakers and local communities to work together on strategies that honour local context while meeting contemporary needs.

6. Conflict of interest

No conflict of interest

Acknowledgements

The authors are thankful to the Department of Architecture and Urban Planning, Pulchowk Campus for providing this opportunity. The authors also express their sincere gratitude to the residents of Te Bahal who participated in this research and shared their valuable insights and experiences.

References

- [1] A. Kovacs-Györi, P. Cabrera-Barona, B. Resch, M. Mehaffy, and T. Blaschke, "Assessing and Representing Livability through the Analysis of Residential Preference," *Sustainability*, vol. 11, no. 18, Sep. 2019, doi: 10.3390/su11184934.
- [2] J. Lau and A. Hashim, "Liveability dimensions and attributes: Their relative importance in the eyes of neighbourhood residents," *Journal of Construction in Developing Countries*, vol. 15, Jun. 2010.
- [3] T. M. M. P. Tennakoon and U. Kulatunga, *Understanding liveability: related concepts and definitions*. 2019, p. 587. doi: 10.31705/WCS.2019.57.
- [4] H.-H. Chen and U. Dietrich, "Measuring Livability at the Neighborhood Scale – Development of Indicators and Methods for the Comparison between Neighborhoods and Best Practice within the Chosen City," *IOP Conference Series: Earth and Environmental Science*, vol. 290, p. 012121, Jun. 2019, doi: 10.1088/1755-1315/290/1/012121.
- [5] M. Capitanio, "The Relativity of Liveability Rankings Examining the Japanese Case against the Global Discourse," *WJSS*, vol. 5, no. 1, p. 12, Oct. 2017, doi: 10.5430/wjss.v5n1p12.
- [6] L. D. T. Siagian, P. K. Stefanugroho, Z. Nisa, I. D. M. F. Septanaya, and P. G. Ariastita, "Assessment of liveability on settlements developed by informal land subdividers in Gunung Anyar and Rungkut Districts, Surabaya," *IOP Conf. Ser.: Earth Environ. Sci.*, vol. 1015, no. 1, p. 012015, Apr. 2022, doi: 10.1088/1755-1315/1015/1/012015.
- [7] P. Purnawan, D. Hellard, and A. I. Baqi, "Gap Analysis of Livable Indicator for Rural Development in Taruang-Taruang Village, West Sumatera," presented at the 8th International Conference on Business, Economics, Social Sciences, and Humanities - Humanities and Social Sciences Track (ICOBEST-HSS 2025), Atlantis Press, Jul. 2025, pp. 169–180. doi: 10.2991/978-2-38476-442-6_16.
- [8] N. Ahmad, F. A. Alias, M. Hamat, and S. A. Mohamed, "Reliability Analysis: Application of Cronbach's Alpha in Research Instruments," 2024.
- [9] O. Gocer, Y. Wei, A. O. Torun, S. Alvanides, and C. Candido, "Multidimensional attributes of neighbourhood quality: A systematic review," *Heliyon*, vol. 9, no. 11, Nov. 2023, doi: 10.1016/j.heliyon.2023.e22636.
- [10] G. Nepal and A. C. Lal, "Designing Walkable City through Public Perspective and Walkability Assessment: A case of Jhamsikhel Neighborhood,"
- [11] J. Wiersma and L. Bertolini, "Making the trade-offs between parking and placemaking visible and actionable," *Journal of Urban Design*, vol. 29, no. 6, pp. 629–645, 2024.
- [12] M. Islam, D. Sarker, J. Hasan, and Z. Momtaz, "Public perceptions on urban open space and city livability in Barishal, Bangladesh," *Geology, Ecology, and Landscapes*, vol. 9, Feb. 2023, doi: 10.1080/24749508.2023.2179749.