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Behavioral aspect of people in the Patan museum

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Abstract

This research examines visitor behavior in a heritage museum, focusing on how spatial layout and exhibit design affect engagement and interaction. It employs both observational methods and structured analysis to understand how factors such as age, exhibit design, and spatial arrangement influence the visitor experience. The findings reveal that different age groups exhibit distinct behavioral patterns. Older visitors tend to prefer interactive activities that allow active participation rather than passive observation. Younger visitors favor open and spacious layouts, as crowded environments create discomfort. Exhibits that are closely linked to historical or cultural narratives significantly increase visitor engagement. The study further highlights the importance of spatial organization, demonstrating that clear sightlines and unobstructed circulation improve interaction. These findings offer evidence-based guidelines for improving museum design and enhancing the overall visitor experience.

1. Introduction

Museums were traditionally conceived as institutions for heritage preservation and public education. However, their role has evolved significantly over time. Contemporary museums function as participatory spaces where visitors are not passive recipients of information but active agents who engage with exhibits and construct personal meaning based on their cultural background, prior knowledge, and individual interests [1]. Meaning is no longer considered fixed or inherent in the object itself; rather, it emerges through the dynamic interaction among the artist, the artwork, and the visitor [2]. This shift highlights the importance of understanding visitor behavior in shaping meaningful museum experiences.

As visitors actively engage in exhibits, the physical environment of the museum becomes very important. Elements such as spatial layout, lighting, object placement, and display density influence how visitors move, observe, and understand exhibits [3][4]. Jeong and Lee [3] found that the exhibition environment, especially layout and object placement, has the strongest effect on visitor satisfaction. Ambient factors like lighting influence satisfaction indirectly by reducing fatigue and improving comfort. Similarly, Han et al. [4] showed that both internal factors (lighting, layout, density) and external environment increase visitor involvement and lead to satisfaction and loyalty, supporting the importance of exhibition design highlighted by Jeong and Lee.

Spatial layout assists visitors in navigating complex or abstract exhibition environments, directly affecting attention span and contributing to museum fatigue when poorly conceived. A well-organized layout enhances learning, comfort, and the overall visitor experience, while an inadequately designed space reduces engagement irrespective of exhibit quality [5].

Although visitor behavior and spatial design have received considerable scholarly attention, existing research rarely examines how these factors interact within the specific constraints of historic, adaptively reused museum buildings, particularly in the South Asian context. Studies that address spatial configuration and exhibit arrangement in relation to visitor movement, attention, and fatigue are especially scarce in heritage museum settings. Patan Museum represents a distinctive

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case study: its 17th-century palace architecture imposes fixed circulation paths and varied spatial proportions that differ fundamentally from purpose-built contemporary museums, while its exhibits draw on the immediate cultural landscape visible beyond the museum walls, creating conditions for uniquely place-embedded visitor behavior[6]. This study, therefore aims to analyze visitor behavior through systematic observation, investigating how spatial layout and exhibit design influence engagement, circulation patterns, and fatigue within the museum environment.

1.1. Research gap and novelity

Most prior museum behavior studies focus on purpose-built contemporary museums in Western contexts, without accounting for the spatial constraints and cultural resonance of historic heritage buildings. This study addresses that gap by conducting systematic in-situ observation within Patan Museum, a 17th-century palace complex adaptively reused as a museum, where traditional courtyard architecture, restricted circulation paths, and culturally embedded exhibits create visitor experiences that standard museum behavior models do not capture. By directly linking visitor movement, dwell time, attention patterns, and fatigue levels to specific spatial configurations and exhibit content within this heritage setting, the study generates evidence-based insights applicable to the growing field of heritage museum design in South Asia and beyond.

2. Methodology

Museums have evolved from one-directional information spaces into dynamic, participatory environments in which visitor engagement is central to the experience. To investigate this engagement, researchers typically employ two primary approaches: surveys (including structured interviews and questionnaires) and observational methods. Surveys capture visitor demographics, opinions, and satisfaction levels, while observation provides direct insight into movement patterns, behavioral responses, and spatial experience [7].

In this study, a nonparticipant observation approach was adopted. Visitors were observed without prior notification to ensure that natural behavior remained undisturbed. Observations were conducted across randomly selected weekdays and weekends to ensure representativeness; visitor movement, time spent at each exhibit, and stopping behavior were systematically recorded. Approximately 87 visitors were tracked across spatial zones, with age group and gender estimated through visual assessment [8]. The collected data were organized using spatial zoning and bubble diagrams to make analysis clear and comparable.

The methodological framework follows a structured five-stage process, as illustrated below:

Observation → Data Organization → Quantitative Measures → Interpretation → Recommendations

To measure visitor engagement, two main indicators were used:

2.1. Attraction power

This shows how many visitors stop at an exhibit compared to those who pass by it. It measures how well an exhibition attracts attention [9].

It is calculated as shown in Equation 1:

$$\text{Attraction power} = \frac{\text{Visitors who stopped}}{\text{Total Visitors in the room}} \quad (1)$$

The resulting index ranges from 0 to 1, where higher values indicate greater attraction of the exhibit.

2.2. Holding power

This shows how long visitors stay at an exhibit compared to their total time in the hall. It measures how well the exhibit keeps attention [5]. It is calculated as shown in Equation 2:

$$\text{Holding Power} = \frac{\text{Average time visitors spent}}{\text{Time required to watch fully}} \quad (2)$$

For example, if an exhibit's intended viewing duration is 30 seconds and the average visitor spends 30 seconds, the holding power equals 1.0, indicating full engagement. If visitors spend less time than intended, the value falls below 1.0, reflecting reduced holding capacity.

2.3. Demographics and context

Most observed visitors were adults aged 25 years and above (approximately 90%). Many visitor groups demonstrated familiarity with the cultural exhibits, likely because the displays document the historical timeline of the Kathmandu Valley and depict local cultural practices, making the content personally resonant with a significant portion of the audience.

2.4. Limitation

As age groups and interest levels were visually estimated, there may be some observer bias in the data. Future studies can include short exit surveys to improve accuracy and verify findings.

3. Discussion of results

3.1. Quantitative analysis of visitor engagement

A total of 87 visitors were observed across multiple days and time periods. Spatial analysis indicates that visitor engagement was highest in the western zone (entry area) and the southwestern zone, declining progressively toward the northeastern and southeastern zones (exit area). The predominant movement pattern follows a north-to-south trajectory, as illustrated in Figure 1.

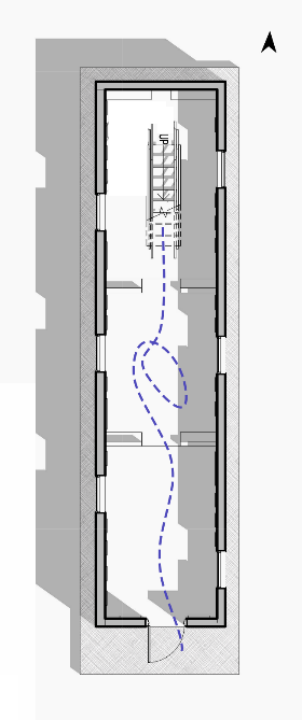

Figure 1: Walking path diagram of plan

- Approximately 72% of visitors stopped in the southwestern zone.
- This figure dropped to 48% in the central zone and further to 29% in the northeastern zone, showing a clear decline in interaction.

Similarly, the average holding time also decreased as visitors moved forward:

- Southwestern zone: 18–22 seconds (average)
- Central zone: 10–14 seconds
- Northeastern zone: 5–8 seconds

These results indicate that while initial exhibits successfully attract attention (see Figure 2 for the spatial arrangement of photographs in the museum), sustaining engagement throughout the hall remains challenging.

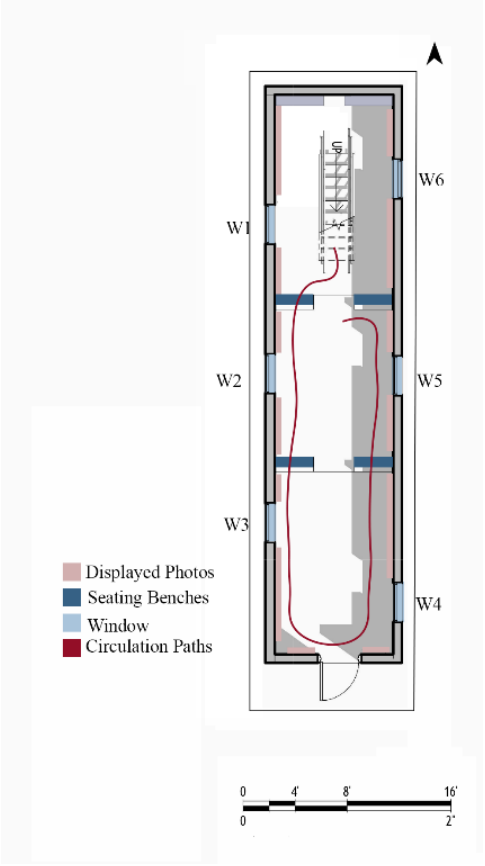

Figure 2: Spatial arrangement of photographs in museum

3.2. Visitor's behavior and fatigue

Visitors exhibited signs of cognitive and physical fatigue, resulting in faster movement and reduced interaction with exhibits in later sections. Continuous exposure to information and a high density of displays contributed to this pattern [10].

3.2.1. Influence of spatial features

Window areas showed peak engagement levels. Approximately 90% of visitors paused near windows, often before interacting with nearby exhibits; these areas attracted the highest concentration of visitors (Figure 3). Natural light, exterior views, and the semi-open design of traditional windows increased curiosity and provided brief mental breaks, which helped mitigate fatigue, as further illustrated in Figures 3, 4, 5, 6, 7, and 8. This suggests that spatial elements such as light, views, and visual connections to the outside environment play a key role in shaping visitors' behavior.

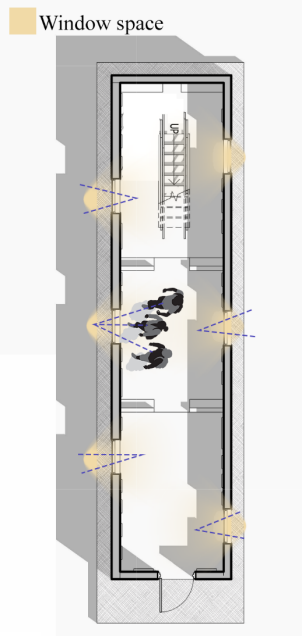

Figure 3: Positions of windows in Plan

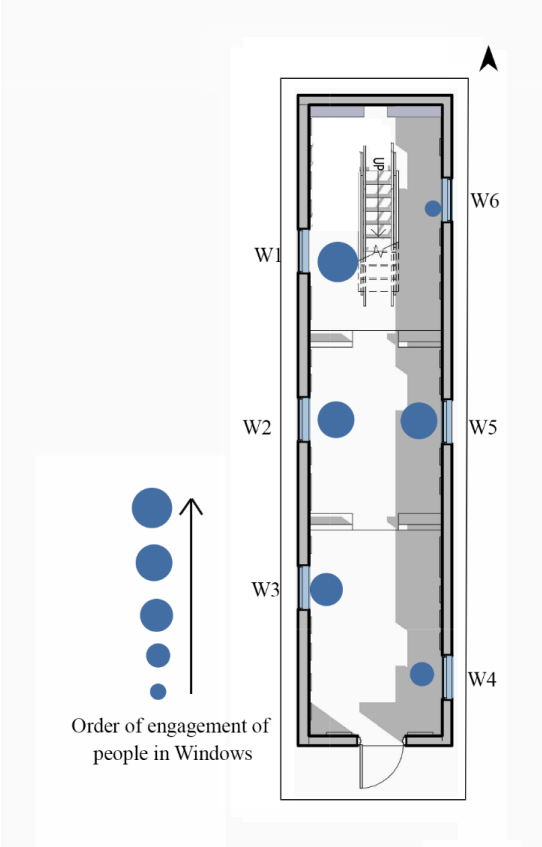

Figure 4: Bubble representations of visitor's attraction in Windows

Figure 5: Visitor watching from W2

Figure 6: Visitor watching from W1

Figure 7: Visitor watching from W3

3.2.2. Content and relatability

Relatability significantly influenced engagement. Visitors were more likely to stop at exhibits connected to their daily life, culture, and familiar surroundings.

Exhibit D13 recorded the highest attraction rate (78% of

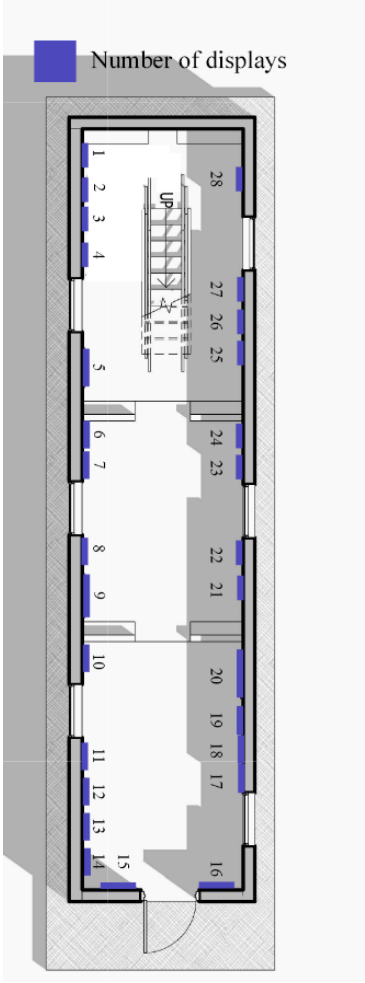

Figure 8: Number of displays in H section

visitors stopped), mainly due to its unique and visually engaging content.

Exhibits D19 and D23 showed higher holding times (average 20+ seconds), as visitors could relate them to well-known landmarks and compare past and present contexts (Figures 9, 10, and 11).

Exhibits D7 and D6 showed the second highest attraction rate (60% of visitors stopped), primarily due to their direct visual correspondence with Patan Durbar Square, visible from the museum premises (Figures 12, 13, and 14).

3.3. Discussion

3.3.1. Demographic patterns

Age-based behavioral differences were observed and quantified across exhibit zones: approximately 65% of younger visitors engaged primarily with exhibits D8 and D9, which depict social and everyday life scenes (e.g., Pimbahal neighborhood), while approximately 70% of

Figure 9: Patan Durbar Square 1899

Figure 10: Gehendra Shumsher with his wife

Figure 11: Pashupati Aryaghat

older visitors spent more time at historical exhibits D19, D20, and D21, featuring imagery of royalty and palace artifacts (Figures 15 and 16).

These findings confirm that personal relevance and cultural familiarity are significant determinants of visitor engagement across age groups. The observed demographic patterns align with existing literature indicating that prior cultural knowledge and personal identity con-

Figure 12: Bhimsen tower timeframe

Figure 13: Car transport

Figure 14: Kalo Bhairava

nections amplify engagement within museum environments [11].

4. Conclusion

This study demonstrates that visitor experience in heritage museums is shaped by the interplay of three principal factors: architectural configuration (spatial layout and circulation), curatorial content (what is displayed and how it relates to visitors' cultural context), and human factors (accumulated fatigue and fluctuating energy levels across the visit).

Visitors are active agents rather than passive recipients of information. They selectively seek out exhibits to which they can relate, particularly those connected to their own cultural identity and lived experience. The

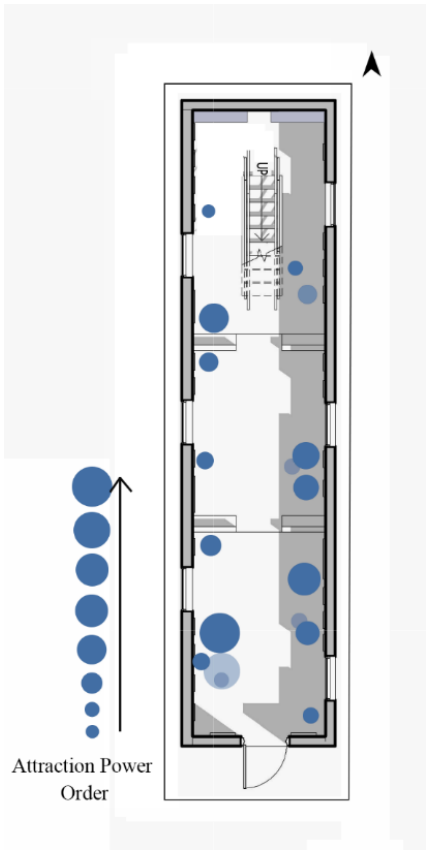

Figure 15: Bubble representations of visitor's attraction in displayed items

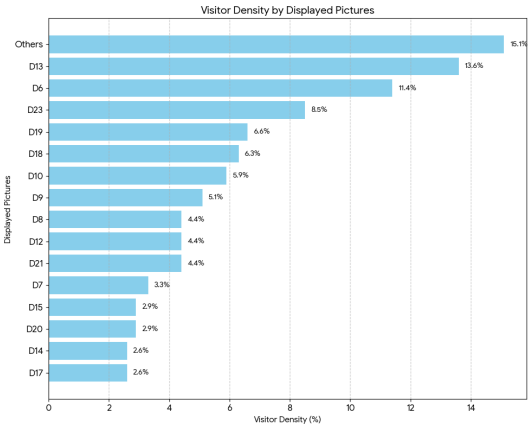

Figure 16: Distribution of visitors across different displayed picture categories (D1-D28)

study further underscores the significance of spatial connectivity: when exhibits are positioned near windows that offer views of Patan Durbar Square, visitors engage more deeply by comparing displayed historical content with the visible contemporary environment, producing a richer and more memorable encounter. Notably, en-

gagement declines in exit zones due to accumulated cognitive fatigue and high information density in preceding sections.

Overall, this study contributes to the field of museum design by demonstrating that visitor engagement is determined not only by the content on display, but equally by how that content is arranged spatially and how the physical environment evolves across the visitor's journey through the museum.

4.1. Implications and strategic recommendations

4.1.1. Reducing vertical fatigue

Finding: Visitors showed lower energy levels on upper floors after viewing many exhibits.

Recommendation: Museum designers should incorporate additional seating areas, windows, and deliberate visual breaks on upper floors. Intentional pauses between exhibit clusters should be encouraged through spatial design to allow visitors to recover before continuing. This approach supports sustained engagement throughout the later portions of the visit [12].

4.1.2. Optimizing information density

Finding: Areas with too many exhibits (especially the northeastern section) had lower engagement and shorter viewing time.

Recommendation: Instead of increasing the number of exhibits, prioritize quality over quantity of exhibits. This enables visitors to engage more deeply with each display and increases average dwell time per exhibit [13].

4.1.3. Improving curatorial pacing

Finding: Visitor energy decreases from entry (southwest) to exit (northeast), affecting engagement levels.

Recommendation: Exhibits should be arranged based on visitor energy levels:

- Position cognitively demanding and content-rich exhibits near the entrance, where visitor attention and energy levels are highest.
- Position simpler, visually driven, or emotionally resonant exhibits toward the exit, as these require less cognitive effort and remain accessible even when visitors experience fatigue.
- Employ clear way finding signage, thematic transitions, and visual cues to help visitors navigate the space intuitively and without disruption to the viewing experience.

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