

CENTRAL ASIAN JOURNAL OF INNOVATIONS ON TOURISM MANAGEMENT AND FINANCE

https://cajitmf.centralasianstudies.org/index.php/CAJITMF

Volume: 07 Issue: 05 | November 2026 ISSN: 2660-454X

Article

Visitor Management Methods for Museums and Historic Sites: Evidence from Uzbekistan's Museum Statistics

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Abstract: This study develops methods for turning annual museum statistics into operational decisions on daily admission, timed entry and the movement of visitors through zones. Official data for Uzbekistan in 2019–2025 on museum visits, the number of museums, visits by school and university students, and guided tours were analysed together with the regional distribution of visits in 2025. Museums recorded 5,474.9 thousand visits in 2025, 14.48% more than in 2024, while the number of guided tours fell by 37.58%. Student visits accounted for 74.3 thousand of the 692.3 thousand additional visits and other visits for 618.0 thousand. Compared with 2019, total visits stood at 70.4%, but non-student visits had fully recovered (101.7%); the shortfall is due entirely to student visits, which were at 32.1% of their 2019 level. Visits are also highly concentrated: Tashkent city and the Samarkand, Bukhara and Khorezm regions received 82.0% of all visits in 2025. Drawing on research on carrying capacity, visitor movement and queueing, the paper proposes a visitor journey that links booking, entry control, zone occupancy and exit counts, operating rules for a multi-site tourist pass, and pilot criteria that evaluate waiting time, access and site conditions together.

Keywords: Museums; historic sites; visitor flows; timed entry; zone occupancy; guided tours; Little's law; Uzbekistan

Citation: Ibragimovich T. K. Visitor Management Methods for Museums and Historic Sites: Evidence from Uzbekistan's Museum Statistics. Central Asian Journal of Innovations on Tourism Management and Finance 2026, 7(5), 169-177.

Received: 10th Aug 2026
Revised: 11th Sep 2026
Accepted: 10th Oct 2026
Published: 20th Nov 2026

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1. Introduction

At a museum or historic site, service to the visitor begins with information before the visit and ends when the visitor leaves. If a queue forms at the entrance, opening an additional ticket desk may speed up the flow. If a corridor or exhibition hall is already crowded, however, faster entry may simply move the problem inside the site. Management decisions therefore depend on measuring where queues form, which routes visitors take and how many people are in a zone at the same time.

These questions are pressing in Uzbekistan. Museum visits fell from 7,777.8 thousand in 2019 to 1,515.8 thousand in 2020 and reached 5,474.9 thousand in 2025 [1]. Demand is concentrated at a small number of heritage sites: in 2023 the Registan Ensemble and the Samarkand State Museum-Reserve each received more than one million visitors [2]. Yet the statistics available to managers are annual national totals, which say nothing about the hour of the day when a hall is full or the minutes a visitor spends in a queue.

The aim of this paper is to examine the dynamics of museum visits in Uzbekistan and to develop the measures needed for daily admission decisions. The research question is how annual change, zone occupancy and access to services for different groups of visitors can be linked. National data describe the volume and composition of demand; setting time-

slot quotas and routes at a particular museum requires on-site observation. The paper makes two contributions: it shows what the official series reveal and conceal about demand, and it proposes an operational framework, including a visitor journey, a set of management methods and pilot criteria, that a site manager can apply.

McCool and Lime argue that tourism carrying capacity, understood as a fixed maximum number of visitors, is more a tempting fantasy than a useful reality, and that managers should first define the conditions to be maintained at a site [3]. Bertocchi et al. nevertheless show, for Venice, that a carrying capacity model can be useful when it is used to simulate scenarios and to design strategies for managing tourist flows rather than to fix a single number [4]. The World Tourism Organization defines overtourism as the impact of tourism that excessively influences residents' quality of life or the quality of visitors' experience in a negative way, and proposes 11 strategies and 68 measures for managing visitor growth in cities [5].

Visitor management combines direct measures, such as quotas and closures, with indirect ones, such as information. A review for New Zealand's Department of Conservation concluded that both managers and visitors prefer information-based approaches to regulation, and that personnel-based approaches are generally more effective than media-based ones, although more expensive [6]. The UNESCO World Heritage sustainable tourism toolkit stresses that managing visitor flows protects the values of a site and contributes to a high-quality experience, and that visitor behaviour cannot be managed without first measuring key variables [7].

Yoshimura et al. note that museums often suffer from "hypercongestion", in which the number of visitors exceeds the capacity of the physical space, and used Bluetooth sensors in the Louvre to analyse visitors' sequential movements and the spatial layout [8]. Centorrino et al. tracked visitors in the Galleria Borghese in Rome with low-cost sensors, built a simulator of visitor dynamics and used it to optimise ticketing and entrance and exit management under comfort and safety constraints [9]. In a review of visitor attraction research, Leask observed a shift from case studies towards quantitative methods for analysing management problems at sites [10]. Together, these studies show that two days with the same number of visits can produce very different conditions in individual rooms.

Little's law states that, under stationary conditions, the average number of units in a system equals the arrival rate multiplied by the average time each unit spends in the system, $L = \lambda W$ [11]. Fifty years later, Little emphasised its use in practice over finite periods of observation, which is how managers apply it [12]. Larson argues that the outcome of a queueing experience may vary nonlinearly with delay, which reduces the importance of the average waiting time, the traditional measure of queue performance [13]. For a museum, this means that the longest waits should be monitored, not only the mean.

Evidence on timed entry comes mainly from protected areas. At Arches National Park, visitors reported better experience quality during a pilot timed entry system and became more supportive of timed entry, while their characteristics remained very similar; they also planned further ahead [14]. Reservation systems may, however, affect who can visit. Using data from seven United States national parks, Hughes finds that longer advance-purchase windows and competition for permits are associated with visitors from higher-income areas, and suggests adjusting the mix of advance and day-ahead permits and using lotteries [15].

Research gap

The literature provides concepts for setting conditions, measuring movement, analysing queues and designing reservations. It offers little guidance on how a museum network that has only annual statistics can move to daily operational decisions, and evidence from Central Asian heritage sites is scarce. This study addresses that gap for Uzbekistan.

2. Materials and Methods

The quantitative analysis covers four annual series for 2019–2025 from SIAT, the open statistical database of the National Statistics Committee: total museum visits, the number of museums including branches, the number of guided tours, and visits by school, lyceum, college and university students [1], [16]–[18]. The data are compiled from administrative reports submitted once a year by the Cultural Heritage Agency [1]. All four series were taken from the version updated on 4 July 2026. The unit of account is the visit; whether a person entering on another day or another museum is recorded as a new visit can only be determined from site-level records. The student series describes education-related visits, and the guided-tour series counts events, not participants.

The regional distribution of museums and visits in 2025 was taken from the Committee's press release on culture and the arts [19], and the visitor numbers of the most visited museums in 2023 from a separate release [2]. The Committee's July 2026 announcement rounded 2025 visits to 5.5 million [20]. Because administrative coverage can change between releases, all calculations use one consistent version of the SIAT series. An earlier release, for example, reported 6,500.9 thousand visits for 2022, of which 51.9% were by students [21], whereas the current series shows 5,673.8 thousand and 59.48%.

Visits per museum were obtained by dividing total visits by the number of museums. Annual change was calculated as the ratio of the current to the previous value minus one, in per cent. The student share was the ratio of student visits to total visits. The change in total visits between 2024 and 2025 was decomposed into the change in student visits and the change in other visits, defined as total visits minus student visits. This decomposition does not create new categories by age, nationality or purpose of visit. For comparison over time, visits, student visits, other visits and guided tours were expressed as indices with 2019 = 100, which allows series in different units to be compared. Raw values are retained in Table 1. Regional concentration was measured by the share of each region in total visits and by visits per museum.

A site is divided into zones that suit its layout, such as the entrance, halls, open courtyards, passages and group meeting points. Planned and actual entries are taken from the entry schedule, and exits and zone occupancy from observation. In operational accounting, the occupancy of a zone at the end of an interval equals its occupancy at the end of the previous interval plus entries minus exits. Periods when a counter fails are checked against a manual count and flagged in a data quality note.

By Little's law, under stable conditions the average number of people in a zone equals the entry rate multiplied by the average length of stay [11]. If, for example, 60 people enter per hour and stay 20 minutes on average, about 20 people are in the zone at any time; if the stay lengthens to 30 minutes at the same entry rate, average occupancy rises to 30. The same relationship can be inverted to derive an entry quota: with a zone threshold of 40 people and an average stay of 20 minutes, the sustainable entry rate is two people per minute, or 60 per 30-minute slot. The calculation is not used to set the permitted limit itself. Zone thresholds are set on the basis of approved conservation, evacuation and service conditions and then checked against on-site measurements [3], [7].

A ticket sold, a booking confirmed and an actual entry are recorded as three separate events. In Figure 1, the paths of visitors who booked in advance and those who buy at the ticket office converge at entry control. The controller checks the current occupancy of the next zone. If capacity is available, the entry and route are recorded; if the threshold has been reached, the visitor is offered the next time slot or a safe alternative route. Exit records are used to plan the next slot.

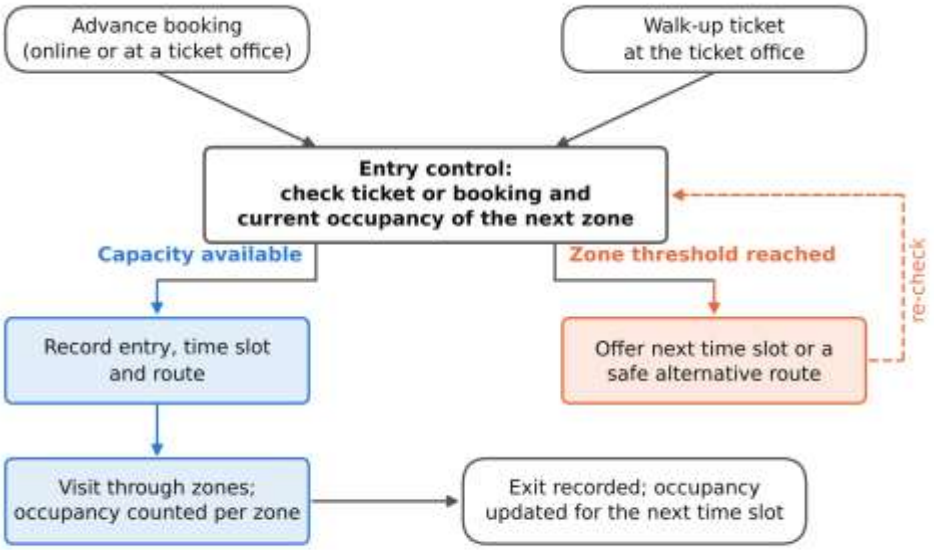


Figure 1. Visitor journey from admission to exit at a museum or historic site

Source: compiled by the author(s) from research on carrying capacity and visitor movement [3], [4], [7], [8].

3. Results

Museums recorded 7,777.8 thousand visits in 2019. The number fell to 1,515.8 thousand in 2020 and recovered to 5,100.0 thousand in 2021. In 2023, 2024 and 2025 visits amounted to 5,711.2, 4,782.6 and 5,474.9 thousand, respectively [1]. Table 1 presents this series together with the number of museums, visits per museum, student visits and guided tours.

Table 1. Museum visits, student visits and guided tours in Uzbekistan, 2019–2025

Year	Museums	Visits, thousand	Visits per museum, thousand	Student visits, thousand	Student share, %	Guided tours
2019	100	7,777.8	77.78	3,497.4	44.97	173,571
2020	105	1,515.8	14.44	798.6	52.69	37,595
2021	127	5,100.0	40.16	2,461.2	48.26	136,993
2022	134	5,673.8	42.34	3,374.6	59.48	105,039
2023	140	5,711.2	40.79	2,004.6	35.10	97,394
2024	138	4,782.6	34.66	1,047.8	21.91	89,940
2025	137	5,474.9	39.96	1,122.1	20.50	56,142

Source: calculated from SIAT series [1], [16]–[18]. The number of museums includes branches. Student visits are visits by school, lyceum, college and university students.

In 2025 total visits rose by 692.3 thousand, or 14.48%, on 2024, while the number of museums changed from 138 to 137 [16]. Visits per museum increased from 34.66 to 39.96 thousand, or by 15.31%. This is an average for the whole network; the working days, daily occupancy and length of stay at an individual museum require institution-level data. Student visits rose from 1,047.8 to 1,122.1 thousand [18]. This increase of 74.3 thousand accounted for 10.73% of the total increase, and other visits for 89.27% (618.0 thousand). The student share fell from 21.91% to 20.50%, so the absolute number of visits should be read alongside the share. The fall in the student share from 59.48% in 2022 to 21.91% in 2024 is very steep and may partly reflect changes in recording rather than in behaviour.

Figure 2 places the series on a common base. In 2025 total visits stood at 70.39% of their 2019 level. This headline, however, conceals two opposite movements. Visits other than by

students reached 4,352.8 thousand, 101.7% of their 2019 level of 4,280.4 thousand, whereas student visits stood at 32.1%. Between 2019 and 2025, total visits fell by 2,302.9 thousand; student visits fell by 2,375.3 thousand, while other visits rose by 72.4 thousand. The entire shortfall relative to 2019 is therefore due to student visits.

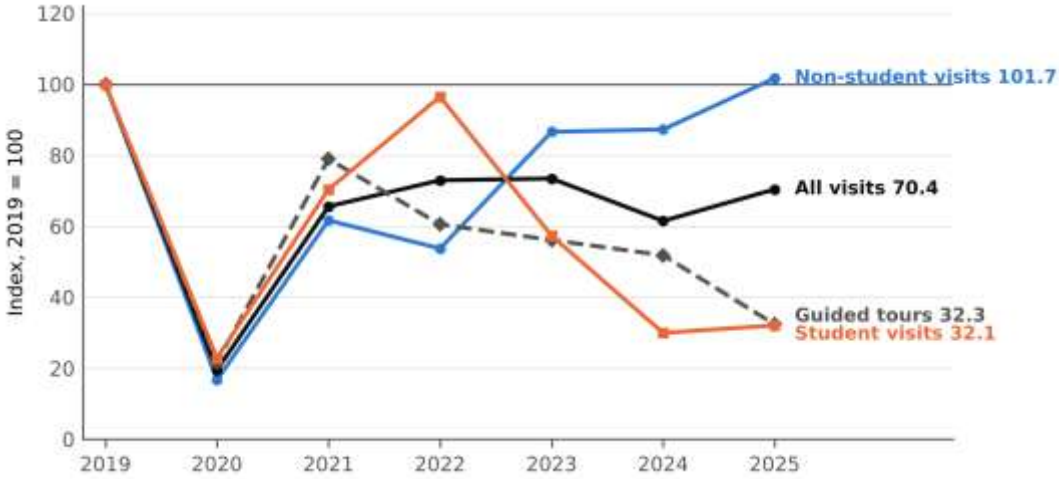


Figure 2. Museum visits, student visits, other visits and guided tours in Uzbekistan, 2019–2025 (2019 = 100)

Source: calculated from SIAT series [1], [17], [18]. Non-student visits are total visits minus student visits.

Guided tours fell to 56,142 in 2025, 37.58% fewer than the 89,940 recorded in 2024 [17], and to 32.35% of their 2019 level. As a result, the number of visits per guided tour rose from 44.8 in 2019 and 53.2 in 2024 to 97.5 in 2025. The fall in the number of tours does not by itself show what share of visitors used guide services: if group size changes, the number of tours and the number of participants can move differently. Reporting should therefore record tours held, groups registered and participants separately. The divergence between rising visits and falling tours creates distinct tasks for two services: entry load and demand for guided services need to be planned separately.

Table 2 shows that demand is highly concentrated. In 2025 Tashkent city received 1,856.6 thousand visits (33.9% of the national total), Samarkand Region 1,183.1 thousand (21.6%), Bukhara Region 879.5 thousand (16.1%) and Khorezm Region 570.5 thousand (10.4%) [19]. These four territories had 85 of the 137 museums (62.0%) but 82.0% of all visits. Samarkand Region had the highest number of visits per museum among the major destinations, 84.5 thousand, more than twice the national average of 40.0 thousand. At the level of individual sites, the five most visited museums in 2023 together received 3,504.6 thousand visits, or 61.4% of the national total; the Registan Ensemble (1,010.8 thousand) and the Samarkand State Museum-Reserve (1,006.6 thousand) led the list [2]. Visitor management is therefore a problem of a small number of flagship sites rather than of the network as a whole.

Table 2. Regional distribution of museums and museum visits, 2025

Region	Museums	Visits, thousand	Share of visits, %	Visits per museum, thousand	Visits per 10,000 population
Tashkent city	35	1,856.6	33.9	53.0	5,903
Samarkand	14	1,183.1	21.6	84.5	2,727
Bukhara	18	879.5	16.1	48.9	4,204
Khorezm	18	570.5	10.4	31.7	2,782
Kashkadarya	3	265.3	4.8	88.4	721
Fergana	12	197.8	3.6	16.5	473
Other eight regions	37	522.1	9.5	14.1	51–636
Uzbekistan	**137**	**5,474.9**	**100.0**	**40.0**	**1,445**

Source: calculated from the National Statistics Committee press release on culture and the arts [19]. The other eight regions are Karakalpakstan, Andijan, Navoi, Namangan, Surkhandarya, Tashkent Region, Jizzakh and Syrdarya; the last column gives their range.

Table 3 brings together management methods for queues, internal occupancy, group arrivals and multi-site admission. Timed entry spreads demand over time, and zone-based routing monitors occupancy inside the site. When an alternative route is designated at a historic site, the service and conservation conditions on the new route are also checked, so that the consequences of shifting pressure from one zone to another can be assessed. With timed entry, accepting a booking and admitting a visitor happen at different times. A 30-minute slot quota indicates how many visits are expected, while current occupancy also shows visitors who remain from the previous slot. Planned arrivals are therefore checked against actual arrival times, and when a tour group arrives early, the availability of a waiting area, the next slot or an alternative route is checked. If decisions are recorded in the duty log, planned and actual flows can be compared at the next shift.

Table 3. Visitor management methods and their outcome measures

Method	When to apply	Operational decision	Outcome measure
Timed entry	Arrivals cluster at certain hours at the entrance	Spread demand across time slots	Median and 90th percentile of waiting time
Zone-based routing	High occupancy in a hall or corridor	Alternative route and admission rule	Share of intervals in which the zone threshold is reached
Group scheduling	Several groups arrive at the same time	Arrival interval and meeting point	Group delay and length of stay
Multi-site tourist pass	Entry to several sites on one pass	Record entitlement, booking and actual entry	Share of bookings followed by actual entry
Variable quota	Change in zone conditions or load	Revise time slots and route	Use of alternative services; abandoned visits

Source: compiled by the author(s) from research on carrying capacity, visitor movement and queueing [3], [4], [7], [8], [13].

4. Discussion

The national series show that demand has recovered unevenly. The headline index of 70.4 suggests a sector still well below pre-pandemic levels, but non-student demand has fully recovered and is concentrated at a few flagship sites. For managers of the Registan Ensemble or the museum-reserves of Samarkand, Bukhara and Khiva, the relevant question is not whether demand will return but how to manage peaks. Annual totals cannot answer that question, which is why measuring key variables at the site must come first [7], [10].

For a tourist pass valid at several sites, purchasing the pass and securing an entry time should be handled as separate steps. At purchase, the visitor sees which sites the pass covers and the conditions for re-entry and cancellation. Each site confirms its own free slots and available quotas, and a visit is recorded after the entitlement, the booking status and the actual entry have been checked. Such a procedure, which takes the operational state of each site into account, helps to prevent visitors from being sent to a closed route [7].

Booking through the ticket office or information staff gives visitors a route other than the online service. The quotas allocated to the ticket office and to digital channels should appear in a single account, and the initial pilot should measure successful entries, waiting and abandoned visits in both channels. Retaining a share of walk-up and day-ahead capacity also matters for fairness, since long advance-booking windows and competition for slots tend to favour better-off visitors [15]. Visitors who need assistance must have up-to-date information on safe access, lifts and entrances, and staff explanations of routing decisions are likely to be more effective than signage alone [6].

Where revenue from a shared pass is settled on the basis of actual entries, the site, time, ticket type and sales channel are recorded. Separate rules apply to repeat scans, cancelled bookings and expired tickets, and the conditions for refunds or alternative services when a site closes are stated in advance. Under a shared pass, the network can also monitor seasonal load: if one site's slots are always full while a nearby site has capacity, visitors can be shown in advance how to reach and use the alternative, and the occupancy of that alternative is then monitored [5].

Baseline observation before a pilot is carried out on weekdays, weekends and special event days using the same definitions. For the time from joining the queue to passing entry control, the median and the 90th percentile are calculated, so that the longest waits are captured as well as the typical one [13]. The use of alternative routes, abandoned visits, the arrival times of school groups and occupancy inside the site are recorded in the same daily log. Because a decision in one slot can affect the queue in the next, the pilot should cover whole duty days, and days with timed entry should be compared with days of the same weekday and event conditions. Rain, repairs, hall closures and outages are recorded.

Two pairs of indicators are monitored together: waiting time and the number admitted, and zone load and completion of the visit. Waiting at the entrance may fall while the number of people gathered in a zone that requires protection rises. Such a result would justify changing the route, lengthening the interval between groups or relocating internal services. The criteria for monitoring the physical condition of a historic monument are set by a heritage specialist, and observations at sensitive zones, heavily used passages and gathering points are linked to the visit log. Even if a small pilot succeeds, conditions in the peak season and with large groups should be checked before it is extended, following the evidence that timed entry can improve experience quality when it is tested and evaluated [9], [14].

5. Conclusion

Museum visits in Uzbekistan reached 5,474.9 thousand in 2025, 14.48% more than in 2024, while guided tours fell by 37.58%. Compared with 2019, non-student visits have fully recovered and the shortfall in total visits is due entirely to student visits. Demand is concentrated: four territories received 82.0% of visits, and two Samarkand sites each exceed one million visitors a year. National statistics should therefore be supplemented by site-level measurement at flagship museums. The proposed procedure links booking with current occupancy, alternative routes and records of actual entry, while retaining walk-up access. Museum and site managers can pilot it on comparable service days and evaluate it by waiting time, access and conservation criteria together.

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