



# Journal of Hospitality Management and Tourism

Volume 7 Number 4 July 2016

ISSN 2141-6575



*Academic  
Journals*



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**ARTICLE**

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Vishal S., Vardhan B. H., Amruta A., Swapnil R. and Rao P. S.

*Full Length Research Paper*

## A case study of Taj Mahal's visitor satisfaction and carrying capacity

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Received 24 June, 2016; Accepted 12 July, 2016

**Tourist makes major contribution to Indian economy and employment rates. Tourism is generally less harmful to the environment compared to other activities like industry. Due to large number of tourists, a lot of environmental stress is being observed within the premises of Taj Mahal. There is a considerable adverse impact on Taj Mahal due to the increase of touristic activities, which is envisaged to rise in future. There is lack of studies on Taj Mahal in regards to international/ domestic visitor experience; therefore a scientific study - in the vicinity of Taj Mahal - with a view to assess the impact of tourist flow has been done. It has been concluded that the maximum number of tourists could be determined so that environmental conditions of Taj Mahal premises and its vicinity are maintained. Moreover, 503 surveying and questionnaires were carried out to gauge the level of the visitor's satisfaction.**

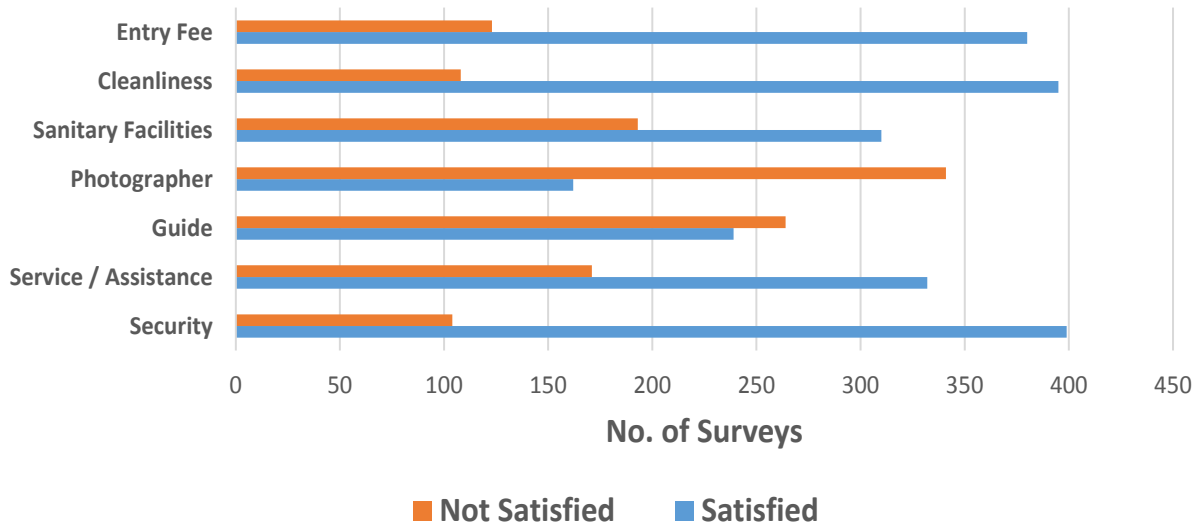
**Key words:** Taj Mahal, world heritage, carrying capacity, tourist influx, tourist feedback, visitor difficulties, visitor satisfaction.

### INTRODUCTION

Agra is the city of the inimitable Taj Mahal. It was the Mughals who nurtured Agra with the finest monuments architects could design. Agra has a reputation of being one of the hottest towns in India; hottest in terms of both, tourist destination as well as temperature. Taj Mahal is one of the Seven Wonders of the World, The coveted title of the World Heritage site is granted by United National Educational, Scientific and Cultural Organization (UNESCO). Taj Mahal was built by Shah Jahan, the fifth mughal ruler, in the memory of his beloved queen Arjumand Banu Begam entitled as Muntaz-uz-Zamanin or Muntaz Mahal. The majestic well proportionate mausoleum and other structural elements of Taj Mahal complex were built in long time span of 17 years from

1631 to 1648, employing twenty thousand workers. Taj Mahal represents the finest architectural and artistic achievement through perfect harmony and excellent craftsmanship in a whole range of Indo-Islamic sepulchral architecture. Due to heavy crowd at Taj Mahal premises, lot of problems have being observed resembling pollution, loss of open space, and degradation of historic site, cultural effects, and irritation due to tourist behavior. Therefore, this study emphasizes the satisfaction level of different attributes of the tourists who visited Taj Mahal. In fact, the success of the tourism industry depends on the level of satisfaction given by the tourists. The tourists will be satisfied when they acquire quality services and warm hospitality. Satisfied travelers will be pleased to tell

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**Figure 1.** Summary of surveys inside Taj Mahal attributes/ services.

friends and relatives about the commendable attitudes and manners of the operators and the workforce at a tourist spot in dealing with them.

### Tourists influx at Taj Mahal

Taj attracts large number of tourists every year. In 2006, total tourists were about 25 lakhs including 5 lakhs foreigners, whereas In 2011, the number was doubled, which includes 6.8 lakhs foreigners, registering an overall growth by 110% in last 5 years. Due to this crowd, a lot of environmental stress is being observed within the premises of site, despite the best efforts being made by the Archaeological Survey of India (ASI).

More foreign tourists were observed during the cooler months, from October to February, whereas Indian tourists were observed more during vacations in summer (May to June) and during Dusshera- Diwali- Christmas period (October to December). This is based on the total number of the sold tickets taking into account that the children below 15 years of age and school are also welcomed free of charge. It has been observed that during the peak times, more than 50,000 Indian and foreign tourists visit Taj Mahal daily. During Urs Festival in February 2012, the number of tourists ranged between 1.5 to 1.8 lakhs per day. Further, the tourists were allowed to pay homage at the main mausoleum, which is situated 20 feet below the super structure. Movement of large number of tourists resulted in high humidity in the chamber (main mausoleum) and water droplets were observed literally flowing through the chamber walls. This phenomenon has been considered as one of the most serious concerns affecting the interior/ original inlay work, and needs to be protected/ preserved against manmade activities including tourists.

### METHODOLOGY

The study depends on surveys and interviews of various constituents of the Indian tourism industry, including tourists. Surveys had been conducted with purposefully designed questionnaires, and interview methods. Proper analysis of the government policies and the data of tourist arrivals and receipts in Taj Mahal were also utilized in deriving conclusions. Tourist Information was gathered from the state tourism departments. In order to study the present status of various basic amenities and facilities/services related to tourists and other stakeholders, a survey was conducted in January 2014.

#### Survey methodology

A questionnaire survey was specifically designed to address various issues related to tourists comfort and their rich experience of visiting Taj Mahal. The questionnaire included the satisfaction level regarding each service/ facility required/ availed by the tourists inside and outside Taj Mahal complex (Fredman and Hornsten, 2004). The survey was conducted hotels and restaurants outside and inside Taj Mahal premises, where tourists could properly respond to the questions asked for.

### RESULTS AND DISCUSSION

#### Tourists feedback

National and International tourists were requested to provide their feedbacks about their experience of visiting Taj Mahal. A total of 503 tourists were interviewed, 43% Indians and the rest was Foreigners. An overall scenario of satisfaction level has been prepared, as summarized in Figures 1 and 2.

Perusal of Figures 1 and 2 indicates that only few tourists were satisfied about the facilities/ services available inside and outside Taj Mahal premises. The interaction with tourists revealed serious concern about

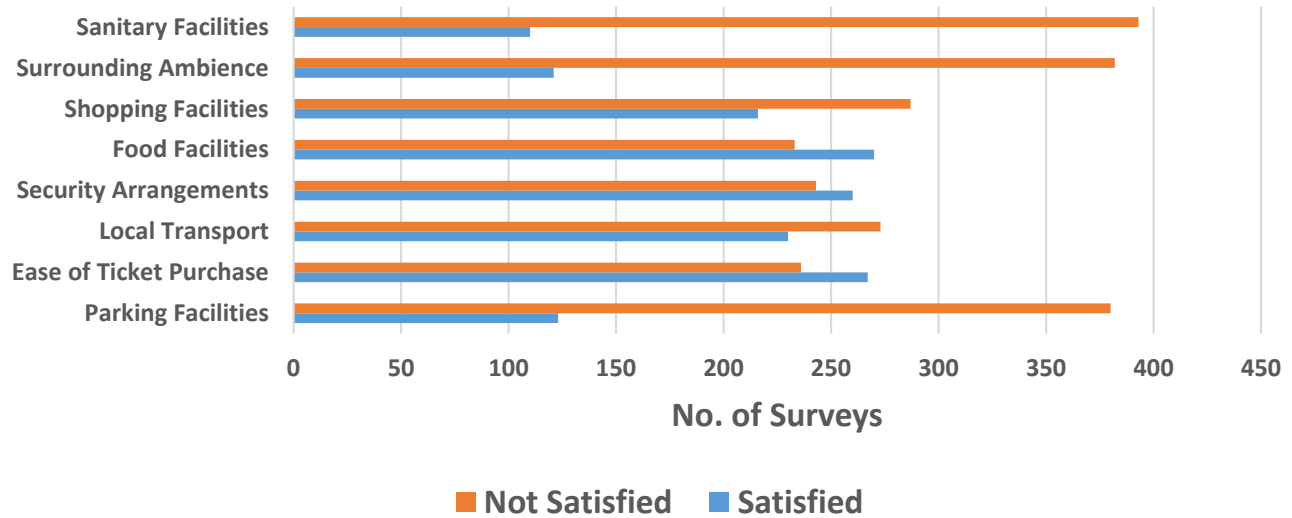


Figure 2. Summary of surveys outside Taj Mahal attributes/ services.

the parking facilities, local transport, guides, photographers, hawkers/canvassers, surrounding ambience, and outside sanitary facilities.

**Carrying capacity study**

The concept of carrying capacity addresses the question of how many people can be permitted into Taj Mahal without risk of degrading the site and the visitor’s experience (Graefe et al., 1984). It has generally been broken down into three categories: Physical, ecological and social (Rastegar, 2010).

Physical carrying capacity called “facility carrying capacity” by the World Tourism Organization mostly has to do with available space the number of beds available to overnight guests, how many vehicles would fill a parking lot, how many campers in a campground, seats in a theatre, and so on. Concomitant to such considerations is the question of fresh water and electricity supply (Rose et al., 2014).

**Physical carrying capacity study**

To estimate the physical carrying capacity of Taj Mahal, the average arriving tourists per hour has been counted manually and through videography. The area available for the public usage in Taj premises has been roughly estimated to calculate the maximum physical carrying capacity of the area shown in Figures 3 and 4.

In order to identify the physical area of tourist flow outside and around heritage structure GIS mapping of various locations inside the complex was undertaken and a scaled map comprising area of each section is given in Figures 3 to 5. It is observed that the path as well as the

area used by tourists were limited vis-à-vis physical carrying capacity of tourist flow. There is a need to remodel the tourist flow in as well as outside through various interventions as to enhance physical carrying capacity.

The average time spent by a tourist starting from ticket purchase, visit the mausoleum and exit was found to be 2.5 h. The required times to see some major locations have been graphically distributed as shown in Figure 6. To calculate the physical carrying capacity of Taj with respective tourists, the area available for each tourist was calculated using GIS for the Red marble area and white marble area as shown in Table 1.

**Worst case scenario (Taj Mahal at its full potential)**

The total area available on the red and white floor = 23,898 m<sup>2</sup>; the physical carrying capacity of the area (Red and white Floor) = Total area/minimum area required by a person = 23,898 m<sup>2</sup> / (0.3716 m<sup>2</sup>/ visitor) = 59,594 visitor .

The carrying capacity along the road length is calculated by:

$$PCC = A * U/a * Rf$$

Where: A = available area for public use; U/a = area required per user = 0.3716 m<sup>2</sup> per person; Rf = rotation factor (number of visits/day) = Open period / average time of visit = 12 h / 2.5 h = 4.8. Let x to be the maximum number of existing groups. From the entrance to the last visiting point, the number of groups is expressed by the following equation:

$$(X*15)+(X-1)*5 = 2,393$$



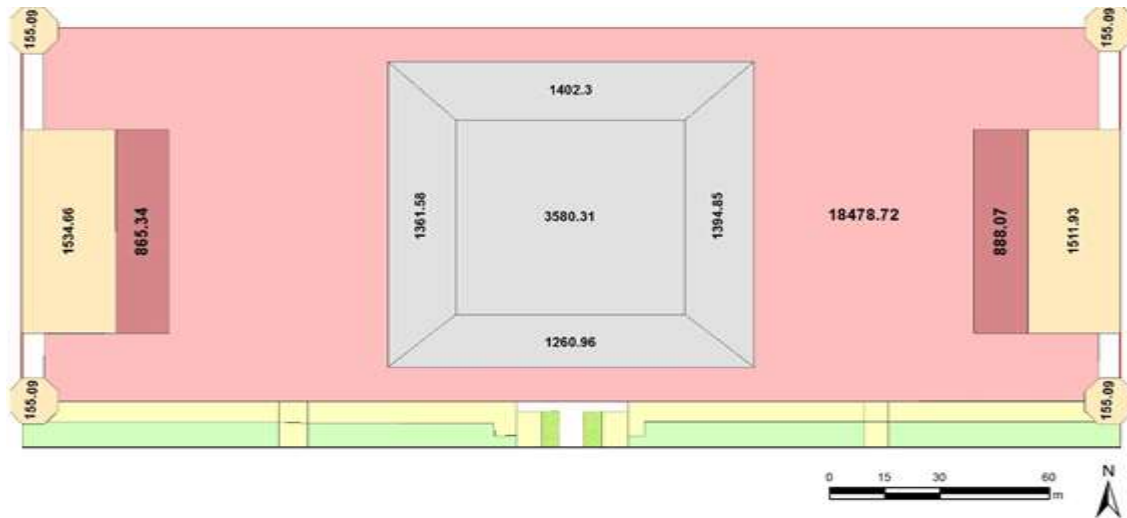


Figure 3. Area in m<sup>2</sup> of red marble floor and white platform within Taj Mahal boundary.

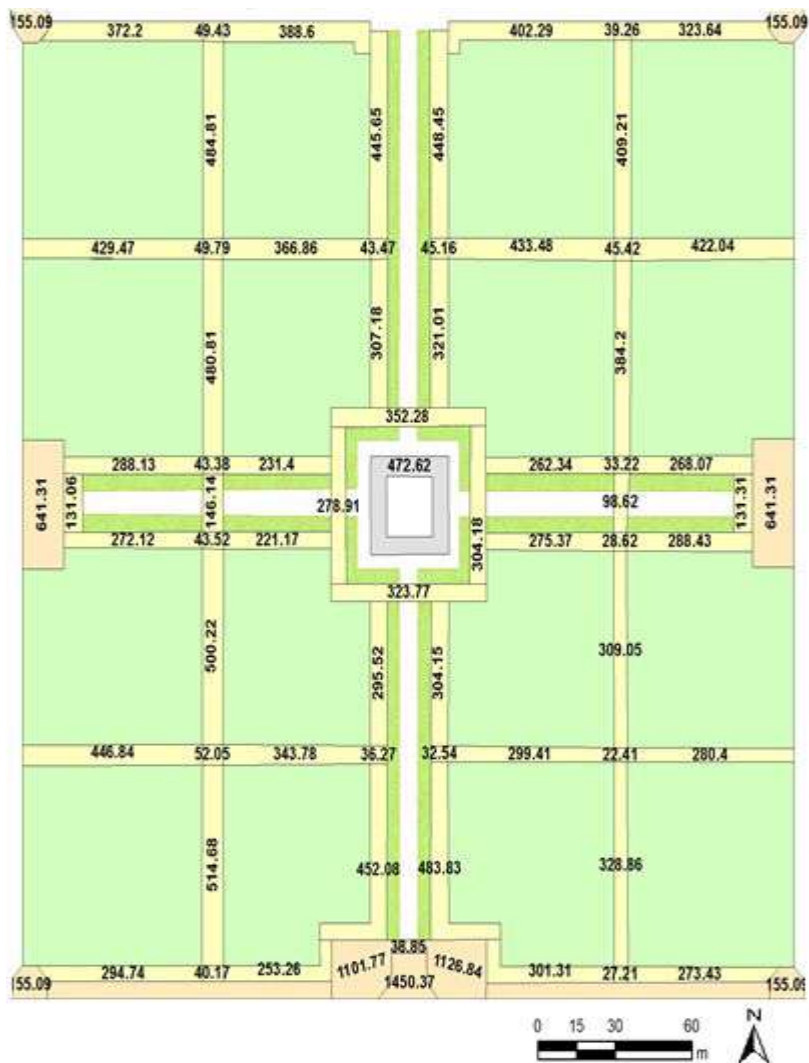


Figure 4. Area in m<sup>2</sup> of pathway within Taj Mahal boundary.

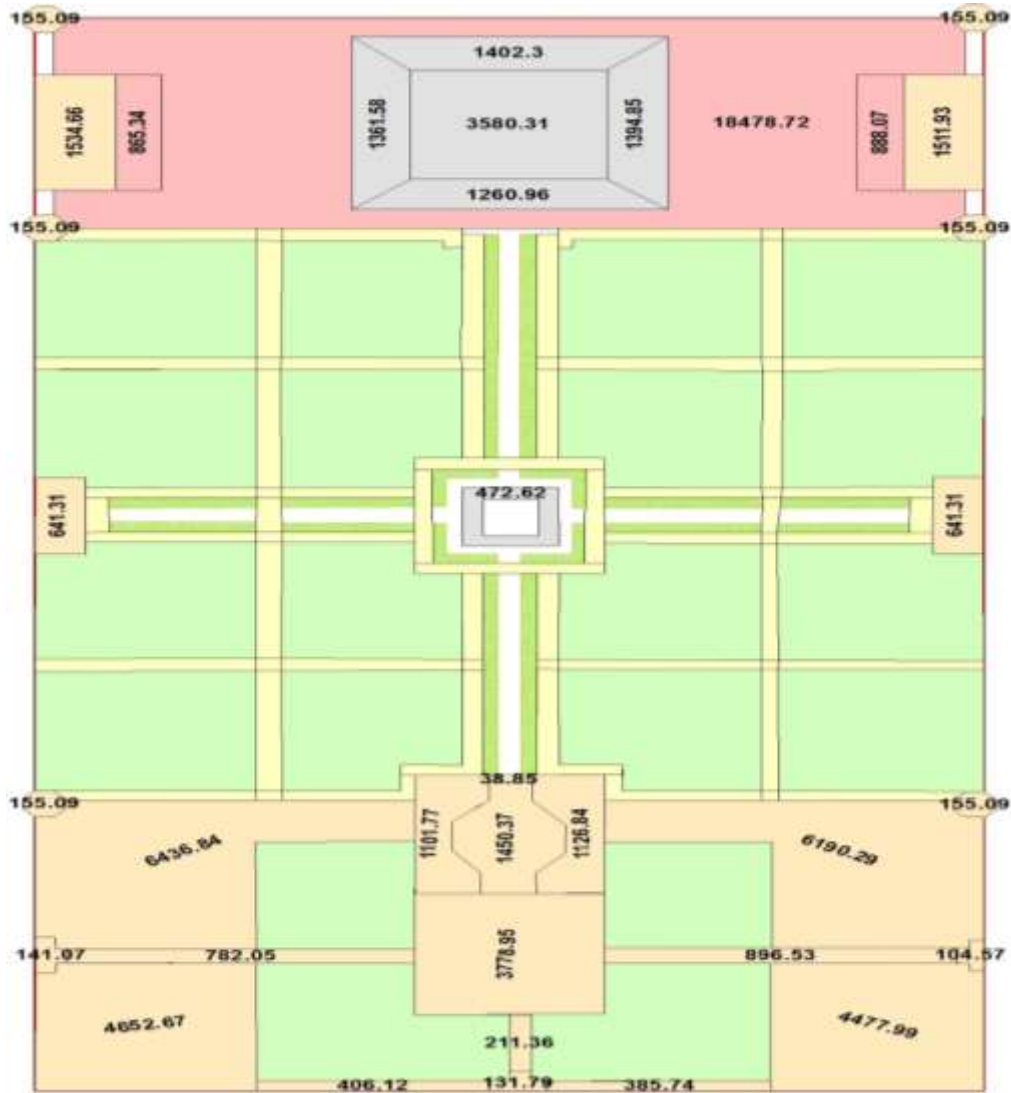


Figure 5. Area in m<sup>2</sup> of each part excluding pathway within Taj Mahal boundary.

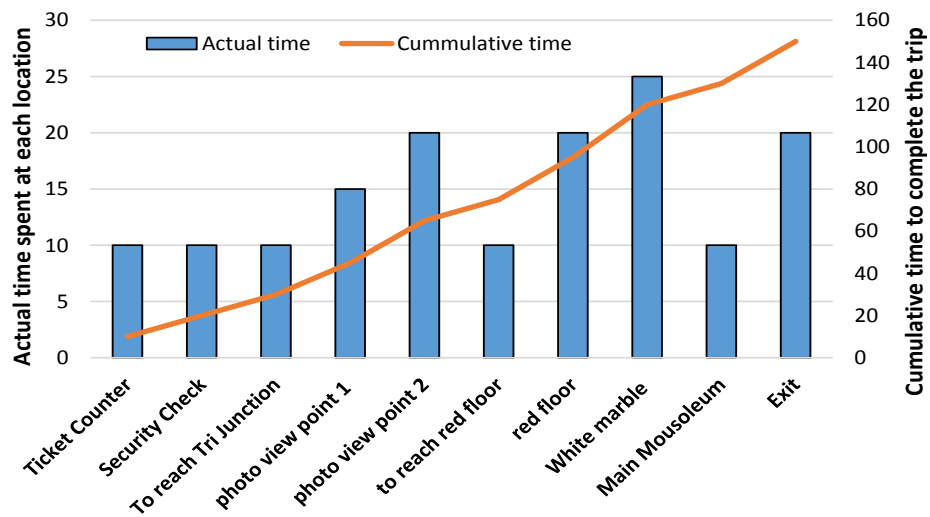


Figure 6. Graphical representation of average times spent by a tourist to complete his visit.

**Table 1.** Calculation of the physical carrying capacity of Taj with respective tourists (the area available for each tourist was calculated using GIS for the Red marble area and white marble area as shown).

Location	Area (m <sup>2</sup> )
Red Marble area	18,478
White platform	5,420
Road area	16,607

Assuming that: The minimum space required for a person to move in comfort = 0.3716 m<sup>2</sup>/ person; The average distance between two persons = 0.5 m; The average required time to complete the tour = 2.5 h; The maximum number of people in a group (including guide) = 15 No; The average distance between two groups = 5 m; Open Period (sunrise to sunset) of Taj Mahal (approx.) = 12 h; The Total road length available for tourists to move along = 2,393 m.

$X = 120$  group

Open period is 12 h/day; each tour is about 2.5 h, thus the number of visits per day is 4.8 times.

PCC along the road length =  $X * 15 * 4.8 = 8,640$  visitor

Total Physical carrying capacity of Taj = (1) + (2) = 59,594 + 8,640 = 68,234 Visitor per day.

### Present status

At present as per observation only 50% (approx.) of the area on both red and white floor regions being utilized by the tourists.

The physical carrying capacity of the area (Red and white Floor) = 50% of 59,594 visitor = 29,797 visitor; PCC along the road length = 8,640 Visitor

Total PCC with respective tourists = 29,797 + 8,640 = 38,437 Visitor/day

But the actual tourist's level observed was 5 to 7% more than the value obtained, which is due to the free entrance of children below 15 years of age.

### Conclusions

Managing a huge number of tourists on daily basis is considered as a big challenge. Further, providing adequate amenities and facilities to tourists are another important aspects which need to be ensured efficiently all times. The aspirations, opportunities and quality of life of the people residing or the people associated with tourist related activities in the vicinity of Taj Mahal needs to be addressed to ensure sustainability of developmental activity/modernization plan proposed around Taj Mahal complex. Detailed discussions with tourists/ local residents resulted in identification of critical issues that need to be addressed on priority, as follows:

1. Proper collection and sanitary disposal of solid wastes.
2. High standard public toilets to meet the tourist's requirements.
3. Separate parking facilities for foreign tourist's vehicles and for locals.
4. Development of Local Park - like Shahjahan Garden - for tourists and also for local visitors.
5. The number of middle level hotels in the vicinity of Taj Mahal is low; therefore visitors prefer to go back, on the same day.
6. More number of budget hotels with better amenities along with well trained and well cultured guides should be made available to tourists folks all along 24 h services.
7. Facility of providing the services of an international level airport, so that the air tourists may drop at this airport and reach their destination point at Agra without wasting their time instead of being dropped at Delhi airport and reach Agra by road or train.
8. Restricting the passage of heavy traffic through the city by constructing a bypass.
9. Improvement of the existing roads condition and categorization of the roads according to traffic load and characteristics of vehicle and direction of flow.
10. Development of visitor's information centres nearby Taj Mahal.
11. Drinking water and toilet facilities should be increased in nearby area.
12. Number of ticket windows should be increased. There are 10 tickets windows available. Four windows situated at east gate, four at west gate and two at south gate only.
13. Taj entrance occupied by nearly 2,000 unauthorized photographers and touts who accost the visitors on the street and in the monument. It threatens the complex security, hence it is recommended to reintroduction of allotment of licenses by concerned authority to professional photographers and license/ approval of guides be done by a single government department.
14. The entry of unapproved guides and photographers and touts in and around Taj Mahal should be totally banned.
15. Taj Mahal proximity needs to be made encroachment-free to attract more visitors, this will also encourage tourists to spend more time in Agra.
16. Number of metal detectors should be augmented.
17. In summer Agra's temperature might reach 48°C so it should be proposed to provide umbrella to high category tickets.

### Conflict of Interests

The authors have not declared any conflict of interests.

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