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Crowding Perception at the Archaeological Site of Tulum, Mexico: A Key Indicator for Sustainable Cultural Tourism

Fernando Enseñat-Soberanis ¹ and Rocío Blanco-Gregory ^{2,*} ¹ School of Anthropology, Autonomous University of Yucatan, Kilómetro 1 Carretera Mérida-Tizimin, Mérida C.P. 97305, Mexico² School of Business, Finance and Tourism, University of Extremadura, 10071 Cáceres, Spain

* Correspondence: rblanco@unex.es; Tel.: +34927257000 (ext. 57971)

Abstract: Just before the lockdown caused by the SARS-CoV-2/COVID-19, the archeological sites close to the Mexican Caribbean were having an exponential number of visitors. The restrictions on traveling due to the pandemic resulted in a decrease in the number of visitors; however, the visitor flow is rising again. This scenario provides a historical opportunity to carry out strategies towards the visitor's management as well as to awake consciousness of the damage caused by the excess of visitors in cultural heritage sites. Establishing limits on the number of visitors is a well-recognized strategy to achieve sustainability in a cultural heritage site. An excess of visitors has an impact on two elements: the cultural resource and the quality of the visitor experience. Crowding perception has been demonstrated to be an effective indicator to evaluate the visitor experience and to determine standards of quality in cultural and natural sites. The place of origin of visitors is among the sociodemographic factors that can affect crowding standards. This study used a quantitative questionnaire based on normative theory and a visual method to identify the crowding standards of national and international visitors at the Mayan archaeological site of Tulum located in the vicinity of the Mexican Caribbean resort of Cancun. The results show that general visitor acceptability decreases as the number of people increase. International visitors are less tolerant to crowding than national visitors as they show the most restrictive acceptable level of people at the same time at the archaeological site. Findings are discussed in terms of their management implications for the development of a tourism-carrying capacity framework for cultural sites, thereby contributing to the achievement of more sustainable cultural tourism.

Keywords: crowding; cultural tourism; sustainable tourism; visitor management; carrying capacity



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1. Introduction

The use of cultural heritage with tourism has proven to be an important economic driver in many cultural sites of the world. For example, in the Mayan archaeological site of Caracol, Belize, revenues generated by visitor fees have funded archaeological excavations and research [1], while in Egypt much of the funding for conservation of its archaeological monuments comes from tourism [2]. In this regard, the purpose of sustainable tourism based on cultural heritage is focused on building strategies that help the competent agencies develop proposals to improve the region's tourism offerings and promote local community socioeconomic development and quality of life.

One of the main negative impacts of tourism is the excessive use that visitors make of natural or cultural resources. This overexploitation has effects on two main elements: the cultural resource itself and the visitor experience, and focusing on only one of these is not an effective way to mitigate the negative impacts of mass visits [3].

Therefore, the proper management and conservation of natural and cultural sites for tourism purposes represents an important factor in boosting the regional or local development of the site involved [4].

Identifying and managing excessive visitor numbers has been one of the most important ways of applying the principles of sustainable development to tourism [3,5,6], and this management should focus not only on protecting the cultural resource from degradation but also on integrating visitor and local community perspectives into the process of planning sustainable tourism [7]. By improving the visitor experience, awareness for conservation can also be improved, as empirical evidence shows that effective cultural interpretation can lead to a more proactive attitude towards conservation [8].

Therefore, crowd management is essential for effective understanding heritage sites, and crowd perception is the key indicator to achieve this.

The perception of overcrowding has proven to be an effective indicator for measuring the quality of visitor experience in protected natural areas such as national parks [3], but it has rarely been applied to cultural or archaeological sites [9,10]. Overcrowding is also often linked to the concept of social or perceptual carrying capacity, which relates to the amount of use that can be accommodated at one site without unacceptably affecting the resource and the perceptions of tourists and locals [11]. In this regard, it is important to note [12] that overtourism is related to other concepts known to tourism researchers, such as carrying capacity, resilience, and sustainability. Of these, carrying capacity is the oldest. Additionally, as Dodds and Butler point out, the concept has fallen out of fashion in tourism studies, despite its obvious relevance in debates about overtourism [12] (p. 12). This relevance is seen in the use of the prefix “over” in the word “overtourism”, with the implication that there is too much tourism in a particular destination, and that tourism exceeds the ability, limits, or capacity of the destination in question. Often, overtourism is also seen as overstretching the capacity of destinations to meet desired standards and limits.

In 2017, the archaeological site of Tulum received 2.2 million visitors [13], making it the third most visited archaeological site in Mexico after Teotihuacán and Chichen Itzá. Today, despite the pandemic, it continues to rank third in number of visitors.

Therefore, this work has two objectives: (1) measuring visitors’ crowding standards contributing to the construction of a methodology to estimate the tourist carrying capacity in archaeological sites; and (2) comparing these standards in two types of visitors: national and international. Similar studies have proven that visitor place of origin influences their perception of overcrowding and shows that there are differences between national and international tourists [14,15].

This study seeks to help improve visitor management at archaeological sites by establishing limits on the number of people within the site at any one time. This contributes to making sustainable tourism operational at cultural sites and adds to the sparse literature investigating the perception of overcrowding at cultural sites in general and in archaeological sites in particular.

2. Crowding Indicators and Standards

Mass access has negative effects on cultural monuments and on the visitor experience. In the case of archaeological sites located in open spaces, it is difficult to measure the damage caused by an excessive number of visitors to the buildings and, consequently, to decide on a maximum number of visitors. Although the cause of the erosion of a sandstone façade or a Maya bas-relief can clearly be recognized as the abrasion of hundreds of hands and feet, it is not feasible to define a specific maximum number of visitors after which the progressive wear of the façade or bas-relief is irreversible. One unaware visitor can cause as much damage to the monuments as 50 aware visitors, or even more [16]. In this regard, rather than finding a magic number, a baseline should be established for the carrying capacity and perception of overcrowding, on the basis of which flows can be managed.

Overcrowded conditions have been proven to make visitors more likely to choose trails not open to the public, causing a negative impact on the heritage resource [17]. Cultural sites with high levels of visitor saturation are more likely to sustain damage than those with low levels of saturation. At the same time, less saturated sites can be better interpreted by visitors and contribute to achieving greater conservation awareness.

The development of indicators and standards has proven to be a good option to make the concept of sustainable tourism operational [5]. Indicators help to “translate the concept of sustainable development from a theoretical level to a decision-making level” [18] (p. 34).

Indicators are “measures that summarize key information about a specific phenomenon” [19] (p. 175) and can be viewed as variables that are an operational representation of an attribute, such as quality [20]. A standard “is a minimum acceptable condition for each indicator variable” [21] (p. 59). Standards are therefore values that can be attributed to an indicator to help administrators make decisions based on minimum quality limits that, once achieved, require management [22,23].

Several tourism and recreational management frameworks have been developed to measure the social aspect of tourism-carrying capacity at natural and cultural sites. The development of these management frameworks for tourism and recreational sites involves three fundamental steps [3]: (1) formulating management objectives and associated quality indicators and standards; (2) monitoring these quality indicators; and (3) implementing management actions when these standards are infringed. In tourism development, the main objective of indicators is to measure the impact of tourism [5], and the perception of overcrowding is a key indicator to assess the impact of tourism on the visitor experience.

At most cultural heritage sites, once restrictive measures are implemented (e.g., a protective barrier, blocking visitors from climbing a temple, or closing a trail), damage to monuments decreases significantly, even if it is not completely prevented [24]. The next logical step, then, is to try to protect the visitor experience with effective crowd management.

2.1. Perception of Crowding

The perception of crowding is the negative evaluation of the density of people at a particular site, and its assessment allows us to define the maximum number of people that visitors expect to see at the same time in a specific location [23]. Identifying this maximum number or overcrowding standard is a fundamental step to improving site management. Overcrowding standards reflect the maximum number of people that a visitor agrees to see in a specific space at the same time before their level of satisfaction begins to decline. The variability of overcrowding standards will depend, to a large extent, on the personal and social norms of each visitor or social group. The use of social norms based on normative theory has proven to be an effective way to establish quality standards for visitor experiences such as overcrowding [25].

2.2. Overcrowding and Visitor Place of Origin

Considering that not all visitors have the same overcrowding standards, one of the interests of this study is identifying the role that place of origin or nationality plays in visitor perception of overcrowding at the Tulum archaeological site. Identifying different overcrowding standards based on visitor place of origin can help site managers implement better visitor management strategies based on visitor type.

Both culture and nationality have been shown to be intrinsic factors influencing visitor perception of overcrowding [14,26–28]. Sayan et al. [15] found that American and British visitors to Turkey’s national parks are less tolerant of overcrowding than Turkish visitors, which they attributed to Turkish culture favoring closer contact, in contrast to the search for solitude in natural spaces that has traditionally characterized U.S. history and environmental policy.

3. Normative Theory

More than 181 studies have reliably used normative theory to develop overcrowding standards in recreation and tourism [23]. Although initially developed in the fields of sociology and social psychology, norms have attracted considerable attention as a theoretical construction and empirical framework in the research and management of tourism recreational activities. Norms refer to what is considered “normal” or accepted by an individual (personal norms) or a social group (social norms) [3,25]. Unlike attitudes, which

are positive or negative evaluations of behavior, social norms have a punitive dimension that sanctions behavior in a formal or informal manner [3]. Many norms have become public policy through standards, regulations, or laws.

There are three approaches to the study and application of normative theory [29]: one that focuses on the variables that activate norms, another that studies the influence of attitudes and norms on the behavior of individuals, and a third that is related to structural characteristics models that seek to determine social standards.

The most widely used model to make normative theory operational is the return potential model (RPM) proposed by Jackson in 1966. This model evaluates a social group's acceptance towards a given behavior. Applied to the psychosocial carrying capacity or perceived crowding of a site, the RPM allows social standards of acceptance of visitor behavior in a tourism–recreational space to be established.

The RPM consists of two main components that are plotted as lines on two axes: the x-axis represents the behavior of the individual or social group and the y-axis represents the evaluation of that behavior through media such as acceptability scales (Figure 1).

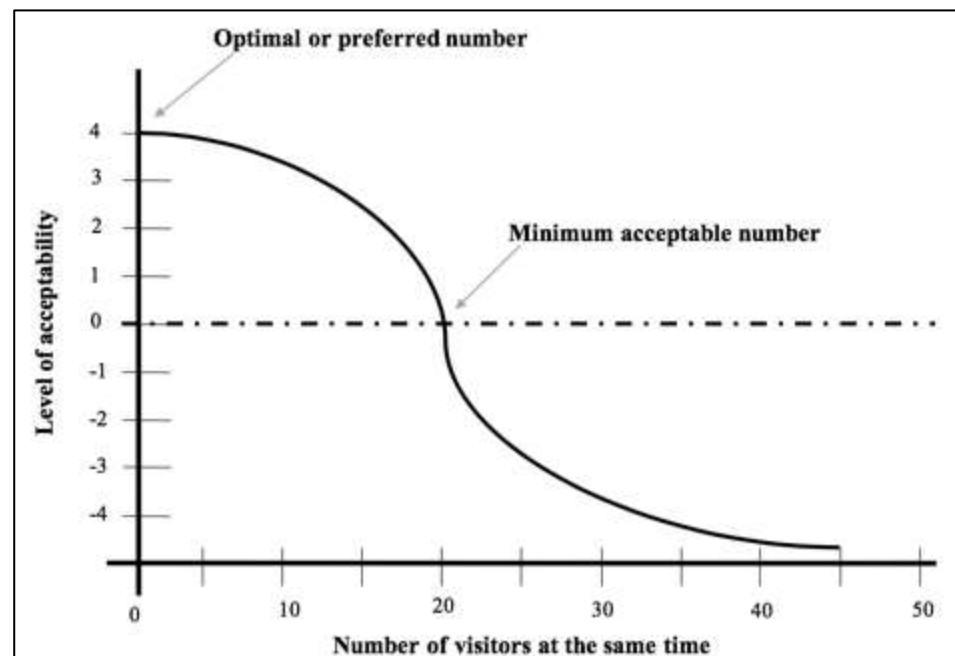


Figure 1. Hypothetical social norm curve (adapted from [25] (p. 43)).

The line produced from the aggregation of the data is called the social norm curve and represents the level of acceptance a group of people has toward a certain social behavior from another group. The ratings by individual members of the group are averaged and serve as a basis for the curve. The curve describes different features of the norm, such as the range of acceptable condition, the optimal or preferred condition, and the minimum acceptable condition [30].

4. Study Area: Tulum Archaeological Site

Tulum is located in Mexico's most important tourist region: the Cancun–Riviera Maya corridor (Figure 2).

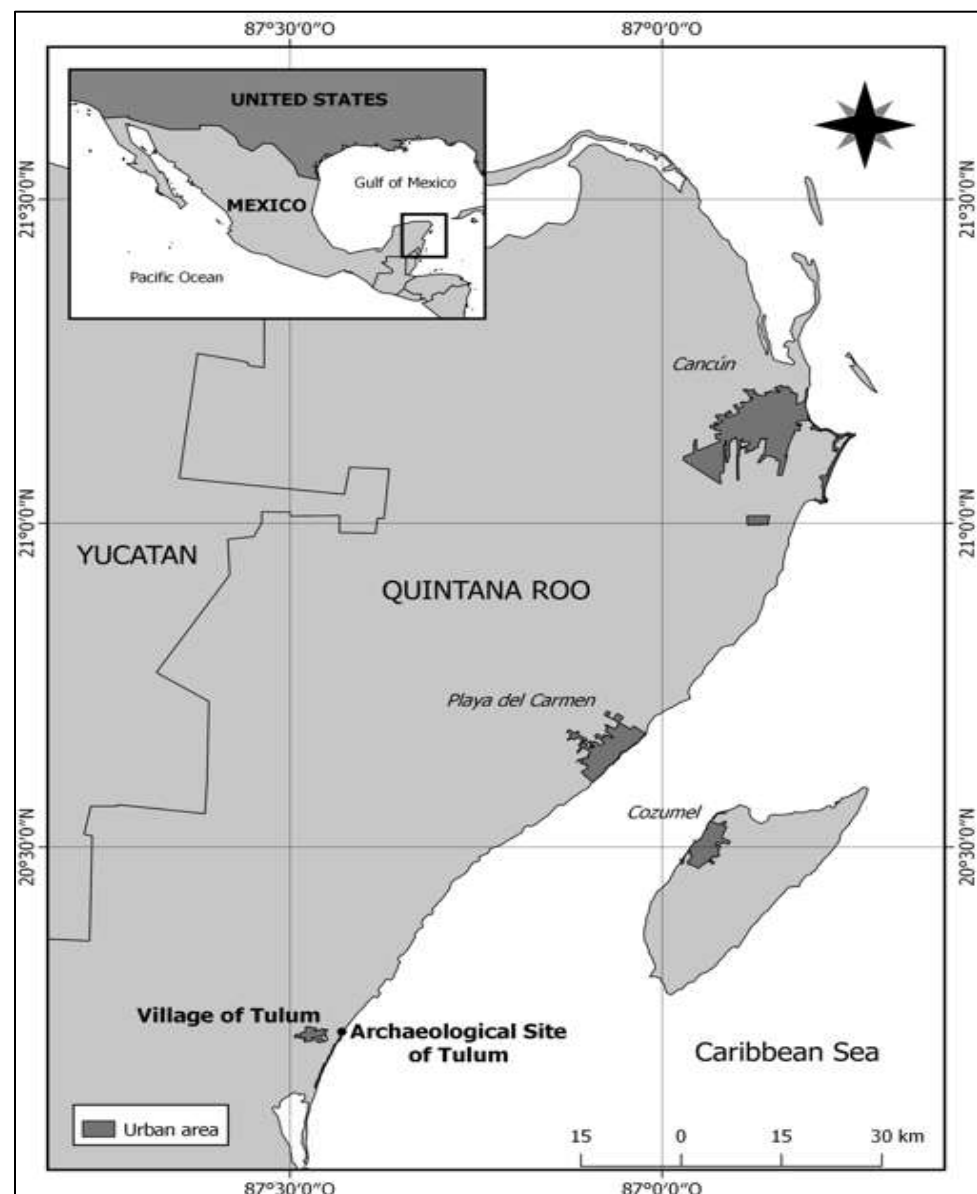


Figure 2. Map of the archaeological site of Tulum. Source: prepared by authors.

The exponential growth of visitors to Tulum is undoubtedly in line with the establishment of Cancun as an international tourist center in the late 1980s. In 1993, Tulum was declared an Archaeological Monument Zone by the Mexican government, giving it a protected national cultural site status.

The Tulum archaeological zone received just under 2.2 million visitors in 2018, of which 61% were foreigners and 39% Mexicans. From 2010 to 2018, it showed an average annual visitor growth rate of 9.5% [13]. The same year that the site was declared an Archaeological Monument Zone, the administrators decided to block visitor access to the main structures of El Castillo and the Temple of the Frescoes due to damage to the staircases, imposts, and ashlar of the buildings caused by too many visitors [31].

New trails and gardens were built in 2005 to keep visitors away from the archaeological monuments, reducing the possibility of damage to heritage. No study of visitor carrying capacity has yet been performed, although the site-management plan mentions there should be one. Therefore, this study provides site managers with a useful tool for the development of overcrowding standards, as well as for determining the tourism-carrying capacity of Tulum.

5. Materials and Methods

Two approaches have been used to determine congestion levels at tourism and recreation sites: the traditional narrative-descriptive approach and the visual approach. The first simply consists of an open-ended survey that asks respondents about the number of visitors encounters they see [32]. The second is the use of a series of computer-manipulated photographs showing different levels of tourism impact (e.g., photos of the same site with different numbers of visitors) [33]. In the case of sites with large numbers of visitors, the visual approach is more appropriate, as photographs make it easier to identify the concept of visitor overcrowding [34]. Thus, this study used the visual approach due to the high levels of use in Tulum.

The data for this study was collected using a specially designed quantitative questionnaire based on normative theory. Questionnaires were administered face-to-face to a representative sample of visitors at the exit of the archaeological site during the peak vacation season from May to April 2018. The percentage of visitors who agreed to answer the questionnaire was recorded, and the data were processed with SPSS Statistics version 24.

The original questionnaire was written in Spanish, then translated into English, and is divided into three parts. The first includes direct questions to understand visitors' general opinion about the problems that overcrowding brings; the second part includes a set of questions and six photographs to find out visitor's acceptance of overcrowding using a 9-point scale developed by Heberlein and Vaske [35]; and the third part includes general sociodemographic data, including place of residence so visitors can be classified as national or international.

Using a series of six photographs, each with different numbers of people, visitors were asked to rate their level of acceptance of overcrowding on a 9-point scale (from +4 to −4) (Figure 3).



Figure 3. Photographs of Temple of the Frescoes used for the study.

We selected the trail intersection in front of the Temple of the Frescoes because it is the busiest part of the archaeological site due to the frequent stops made by tour guides explaining the frescoes inside the building.

The photographs were edited with Photoshop PS6 to obtain six different images; the first one with no visitors, and the last one with a number equivalent to the maximum density of use (MDU) of the trail intersection. That is, the maximum number of people that the intersection could accommodate based on its surface area in square meters, which is 418 m². The maximum density of the use of the intersection was considered as the limit of people a visitor should be able to encounter in this space.

To estimate the MDU, the total surface area of the intersection was divided by 4 m², which is the estimated personal space needed for a tourist to feel comfortable in leisure spaces [36]. Thus, the MDU was derived by dividing 418 m² (the total area of the intersection) by 4 m² (the vital area needed by a visitor). The result was 105 people, and it is considered for this study as the maximum number of persons the intersection could have at the same time. This maximum number of people was used in photograph number six. To determine the number of people to use in the other five photos, 105 was divided by 5 (=21), leaving the first photo with zero visitors. The average rating assigned to each photo by the respondents was used to construct the social norm curve.

6. Results

The finding allows the establishment of crowding standards for an archaeological site and confirms that found in other studies where the level of acceptance of visitors decreases as the number of people increase.

A total of 400 questionnaires were applied to tourists leaving the archaeological site, with a response rate of 56% ($n = 224$). Of the 224 respondents, 64% were international visitors and 36% were Mexican. Systematic sampling was used to select questionnaire respondents.

6.1. General Visitor Profile

The majority of visitors interviewed were between 18 and 29 years old (55%), and 35% were between 30 and 44 years old. The smallest group was 60 years of age or older (4%). In total, 62% percent had completed undergraduate studies and 20% had a graduate degree, while 83% of respondents stated they were visiting Tulum for the first time.

6.2. General Perceived Problems Related to Crowding in Tulum

Visitors were asked two questions to find out their general perception of problems related to overcrowding. The feeling of being overwhelmed due to a lack of space (40% of respondents) and being unable to take good photographs (20% of respondents) were the most frequently cited problems due to crowding, according to visitors. The general perception is that Tulum is currently over-utilized (70% of respondents). It is noteworthy that only 5% of respondents mentioned the damage to the archaeological site as a problem related to crowding.

6.3. Crowding Norms for All Visitors to Tulum (Temple of the Frescoes)

All visitors interviewed were asked to rate their level of acceptance of each photograph on a 9-point scale ranging from -4 to $+4$, developed by Heberlein and Vaske [35], where 1 equal “not at all crowded” and 9 equals “extremely crowded”. Social norm curves were constructed from the means of the responses to the questions on the acceptability of the number of people in each photograph (Figure 4).

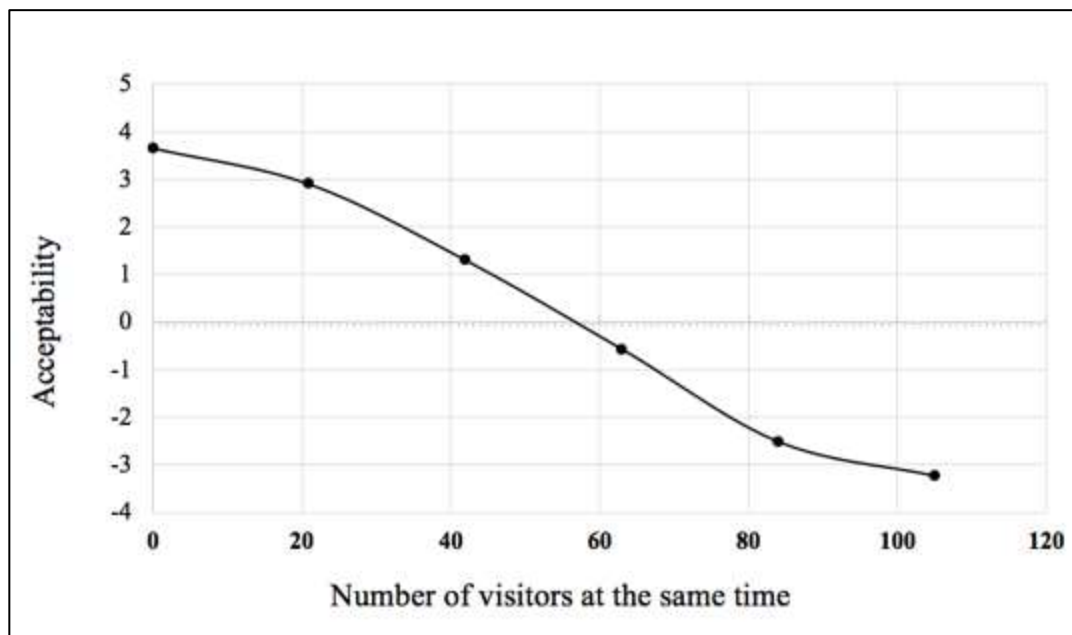


Figure 4. Social norm curve for Temple of the Frescoes.

Overall, the average acceptance of crowding norms for all visitors to the Temple of the Frescoes ranged from 3.66 to −3.23 as the number of people in the photographs increased from 0 to 105.

The maximum accepted number of people a visitor is willing to see at the same time at the intersection in front of the Temple of the Frescoes is 57. After this number, visitor acceptance begins to decrease. The optimal or preferred condition is when the site is empty, as it received the highest level of acceptance from the sample.

6.4. National and International Visitor Profile

Table 1 show the profile of national and international respondents.

Table 1. Profile of national and international visitors.

		National Visitors (%)	International Visitors (%)
Gender	Men	57	43
	Woman	43	57
Age	–18	1	0
	18–29	46	59
	30–44	38	34
	45–59	8	5
	60+	8	2
Degree completed	less than high school	4	6
	high school	24	10
	undergraduate degree	65	59
	Master/PhD	8	25

6.5. National and International Visitor Perception of Problems Related to Crowding in Tulum

The proportion of respondents who perceived problems regarding crowding varies between national and international visitors. Being overwhelmed due to a lack of space was mentioned by 33% of nationals and 36% of internationals, and being unable to take good photographs was mentioned by 16% of nationals and 22% of internationals. While 78% of

international visitors perceived Tulum as over-utilized, only 56% of nationals mentioned the same.

6.6. Comparison of Overcrowding Levels for National and International Visitors to Tulum (Temple of the Frescoes)

The level of acceptance for both types of visitors (national and international) at the intersection in front of the Temple of the Frescoes decreases as the number of people increases (Figure 5). The lowest acceptance can be seen among international visitors, with 52 people at the same time. Mexican visitors show higher acceptance, with 68 people at the same time.

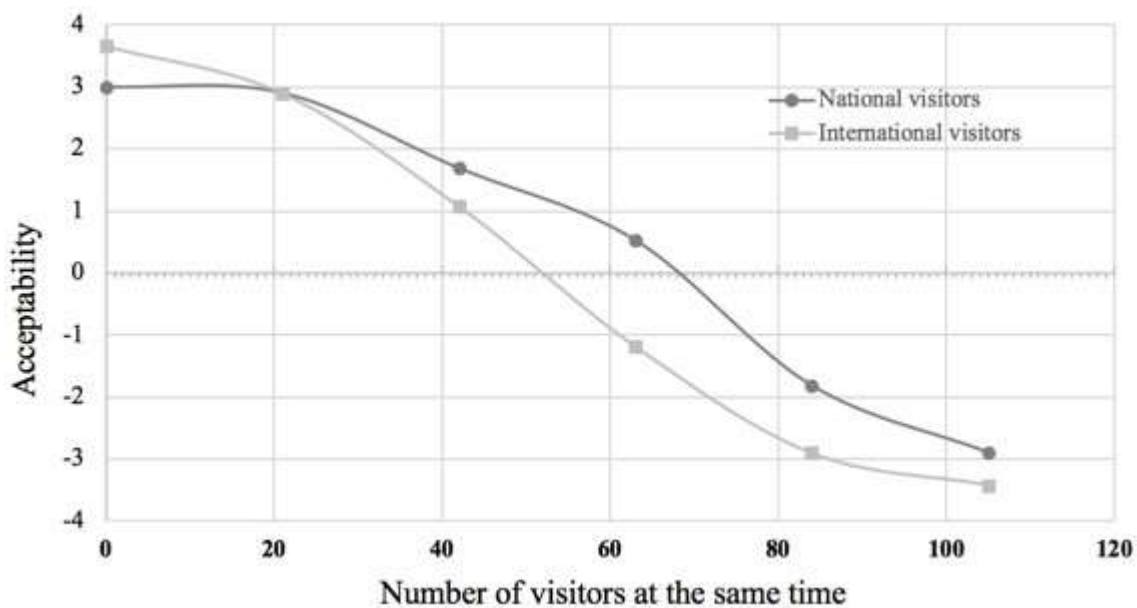


Figure 5. Social norm curve for type of visitor at the Temple of the Frescoes.

An independent samples *t*-test was used to determine the mean score differences between the acceptance of crowding in national and international visitors. The results show significant differences ($t = 2.7, p < 0.05$) among nationals and international respondents. This confirms that international visitors are less tolerant of overcrowding than Mexican visitors.

For both types of visitors, the optimal number of people they prefer to see on the site is zero. However, international visitors valued empty space more highly than Mexican visitors.

7. Discussion and Conclusions

Although an excess of visitors can cause damage to archaeological monuments, once climbing onto the most fragile archaeological buildings is prohibited, damage to the monuments decreases considerably, even if it is not completely prevented. What remains is the impact on the visitor experience, which can be improved with the identification of crowding standards, which are quality indicators for evaluating the heritage experience from the visitor's perspective and reflect the maximum number of people a visitor agrees to see at the same time in a specific space before their level of satisfaction begins to decline. Moreover, the place of origin of visitors is among the sociodemographic factors that can affect crowding levels of acceptance [27,37], and its knowledge allows for a better understanding of the different types of visitors. Therefore, this article uses normative theory and visual research methods to examine and compare crowding standards at the intersection in front of Temple of Frescoes (Tulum) for two types of visitors: nationals and internationals. Crowding is an important issue to visitors in determining the quality of their experience [9], and a positive experience during visits to cultural heritage sites can be expected to lead to increased awareness of heritage conservation among visitors [8,22,38].

This research contributes to the sparse literature measuring crowding levels at archaeological sites as most studies focus on natural sites such as National Parks. It is also the first attempt to measure crowding standards at a touristified archaeological site in Mexico. The results show that for all visitors, acceptance in Tulum decreases as the number of visitors increases, with 57 people at any one time being the maximum number of visitors they agree to see at the trail intersection in front of the Temple of the Frescoes. This coincides with the results found by Manning [25] in the archaeological site of Mesa Verde, Colorado, USA, where the level of acceptability to see other people at the cliff dwellings decreases as the number of visitors increases. The same results were found in Petra, a Jordanian archaeological site, where the measurement of crowding standards allowed one to determine the maximum number of people that visitors agreed to see [9].

The origin of the visitors is among the sociodemographic factors that can affect crowding perceptions [27,37]. The findings of this study show differences between national and international visitors. International visitors have a lower level of acceptance, with 52 people at the same time, compared to national visitors, who accept seeing more people (68 people at the same time). These findings coincide with those found by Santiago et al. [14] and Sayan and Karagüzel [39], who showed that local Puerto Rican and Turkish visitors are more tolerant of crowds than international visitors from developed countries. This could be due to cultural factors of Mexicans who engage in recreational activities in a more collectivist manner, in large groups and incorporating members of their extended family, while foreign visitors, mostly urban citizens from developed countries, tend to travel and seek out recreational activities in couples, in small groups, or with members of their nuclear family [14,15,22]. Future research should formulate crowding norms in different parts of the archaeological site of Tulum such as the beach, where visitors spend half of their allotted time visiting the site. Moreover, future research is needed to know if the origin of visitors is affecting the way the site is being interpreted and what type of cultural interpretation is more suitable for each type of visitor.

Management Implications

The normative standards identified in this study provide empirical guidance to develop and implement visitor management strategies in other similar cultural heritage sites around the world experimenting excess of visitors. These management strategies could range from direct approaches such as limiting the number of visitors, to more indirect approaches, such as distributing visitors in time and space through entrance timeslots that allow the site to have a visitor flow without agglomerations [9,40]. Findings also can serve to determine a visitor-management framework such as LAC (Limit of Acceptable Change) and carrying capacity at archaeological sites with similar characteristics.

The more restrictive acceptable number of visitors at the same time showed by international visitors should be used by administrators as the baseline from which to determine a limit of use. This is even more important in sites such as Tulum dominated by foreign tourists. It is important to recognize that cultural heritage sites represent the worldview of a culture in each territory and place in time. These sites enrich our common knowledge of ourselves as humans, and crowd management is key to encouraging visitors who want to preserve them.

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