

Taking Advantage of e-WOM to Study the Relationship Between Museums and Visitors: The Maritime Cultural Context

Umberto Rosin, Elena Bellio, Francesco Casarin

Venice School of Management – Ca' Foscari University of Venice, Italy

Umberto Rosin is the general coordinator of the International Master's degree in Management of Cultural Assets and Activities (MaBAC) held by ESCP Business School and Ca' Foscari University of Venice where he teaches marketing of arts and culture. He holds a Ph.D. in management, and his research interests concern marketing of arts and culture, organizational behavior, and consumer behavior.

Presenter:

Umberto Rosin

Venice School of Management

Ca' Foscari University

Fondamenta S. Giobbe, 873

30121 Cannaregio, Venice – Italy

umberto.rosin@unive.it

Elena Bellio is an Adjunct Professor and Research Fellow at Ca' Foscari University, Venice, Italy. Her research focuses mainly on the use of digital innovation in service marketing. Her main areas of interest include Customer Service Science in public services; Healthcare, Government and Non-Profit Marketing; Arts and Culture Marketing; and Sustainable Marketing.

Francesco Casarin is a Professor of Marketing and Director of the research laboratory in Management of Art and Culture at Ca' Foscari University of Venice. He is also the director of the international master's degree in Management of Cultural Assets and Activities. His research interests include cultural marketing and marketing culture.

Abstract

Museums must compete in an increasingly complex environment; identifying and exploiting success factors can make the difference. Given the current state of the field, there is a need for more discussions on how maritime museums are responding to both opportunities and challenges stemming from their strong linkage with historical pasts and the territories they inhabit. This research aims to study the relationship between different categories of maritime museums and their visitors' electronic word of mouth (e-Wom). A model is designed by integrating two matrices: one representing museums (offer) and one representing visitors (demand). Both sentiment and content analyses are performed considering visitors' reviews published on TripAdvisor, supported by Atlas.ti software and ChatGPT. Managerial implications are derived in terms of e-Wom valence improvement and strategies to attract new visitors.

Keywords: maritime museums, visitors, electronic word of mouth, content analysis, sentiment analysis

Introduction

Studying museums from a managerial perspective is crucial as it enables them to navigate complex organizational challenges, secure financial sustainability, and enhance visitor engagement. As argued by Paine (2016), the main challenge for maritime museums today is to make themselves relevant in the 21st century. Despite existing research, there is a need for more discussions on how maritime museums are responding to opportunities and obstacles arising from their unique connection to historical pasts and their local territories. This research aims to deeply analyze Mediterranean Maritime Museums by adopting both visitors' and management perspectives, recognizing the significant economic dependence of Mediterranean countries on coastal tourism. Using a qualitative exploratory approach, this paper lays the groundwork for

identifying key variables in organizational or business models by which maritime museums face their challenges. The research also aims to identify the most relevant performance factors.

Visitors' Perspective through Electronic Word of Mouth

The valence of electronic word of mouth (e-Wom), defined as the positive or negative rating given by consumers (King, Racherla et al. 2014), is used as a measure of customer satisfaction (Tontini, G. dos Santos Bento et al. 2017). E-Wom has become a significant asset in a museum's strategic development plan (Daskalaki, Voutsas et al. 2020). Spontaneous visitor comments and reviews from alternative sources provide specific insights into visitors' experiences that traditional interviews may overlook. Researchers have found that visitors prefer digital reviews due to their ease of use, accessibility, immediacy, freedom of expression, and integration with existing communication means (Winter 2018, Stoleriu, Brochado et al. 2019). E-Wom is a relevant data source for studying consumer behavior and museum consumer experiences, as user-generated content helps assess consumer-driven evaluations and adjust strategies (Dickinger and Lalicic 2016). User-generated content in museums is also crucial in consumer decision-making processes and can predict willingness to visit (Nguyen and Tong 2022).

Aggregator websites, like TripAdvisor, have become powerful tools (Radojevic, Stanisic et al. 2015), and TripAdvisor is currently the most popular travel website with user-generated content (Lu and Stepchenkova 2015). When writing reviews on TripAdvisor, consumers know that this online content will be available to a global audience (Lu and Stepchenkova 2012). The reviews' impact and credibility vary depending on the reviewers' expertise, often measured by the number of reviews they have posted that have been rated as popular or helpful (AmArAl, TiAgo et al. 2014).

Traditionally, museums have been defined by their functions, such as collecting, preserving, and displaying objects. Modern definitions, however, relate to the intent, vision, or mission of the museum, focusing on leadership and visitor services (Kerrigan, Fraser et al. 2007). The primary relationship is now seen as between the museum and its visitors rather than between the museum and its collection (McLean 2012). Museums preserve the past, transforming it into a part of the present as an object of tourism attraction. TripAdvisor reviews offer museums the opportunity to understand visitors' experiences and use this knowledge to improve satisfaction (Alexander, Blank et al. 2018, Zanibellato, Rosin et al. 2018).

Research shows that different audience segments visit for different reasons (Wiggins 2004). In museums, it is possible to group visitors based on their responsiveness. Properly understanding this element allows different groups to be treated according to their features (Kerrigan, Fraser et al. 2007). Two main drivers can be considered for profiling visitors: (a) motivation and commitment related to a specific topic, and (b) the frequency of museum visits.

- Commitment Related to a Specific Topic

The consumption of a cultural product is generally the result of a combination of motivations, which can be work-related (study and research) or leisure-related (hobbies, special interests). Understanding these motivations helps in understanding demand characteristics (Moretti 1999). A visitor to a museum may identify with and appreciate the collection, while another may see it as meaningless (McLean 2012). Commitment and motivation influence the level of expertise, with more interested visitors seeking complete satisfaction, trust, and commitment (Kerrigan, Fraser et al. 2007).

- Frequency of Museum Visits

Museum users can be typified based on the frequency of visits, from occasional visitors to enthusiasts who visit frequently. Light users or occasional visitors contrast with heavy users or frequent visitors, who attend museums several times per year (Kotler, Kotler et al. 2008).

Defining Maritime Museums

Maritime museums play a significant role in the sustainable development of coastal areas and the preservation of maritime heritage, which can be a significant attraction (Magni, Appiotti et al. 2021). Hicks

(2001) defines Maritime Museums as a subcategory of history and ethnography museums. Maritime museums help define collective and individual identities through the journey of discovery and self-knowledge. Davies (2012) adds that maritime museums' role is to collect, preserve, and display objects from past and present maritime life, educating and informing visitors. Two main topics help categorize maritime museums: (a) the museum's approach (local or national) and (b) the level of proactivity.

- **Local or National Museum Approach**

Museums can be defined by their legal subjectivity and organizational aspects, depending on whether they belong to local entities (e.g., municipalities, provinces) or territorial public entities (e.g., regions). Beyond specific nature, museums aim to conserve, enhance, and publicly enjoy collections of cultural heritage (Dainelli, Capogrossi et al. 2002). Local museums often offer intimate experiences, connecting visitors with objects and stories in a personal way (Štefan 2023). Museums should tell the story of how the sea has been a ground for exchange over the centuries (Davies 2012).

- **Level of Museum's Proactivity**

Proactivity reflects a museum's commitment to activities in society, addressing specific visitor segments, and initiatives regarding collections (Del Barrio, Herrero et al. 2009). Originally focused on collections, museums now also provide experiences and organize events, generating income and engagement (Kotler, Kotler et al. 2008, McLean 2012). Paulus (2003) describes these activities as "realization" indicators, with more projects indicating greater productivity.

Methodology

This research employs an exploratory approach with a qualitative methodology, structured as follows:

1. Creation of a Euro-Mediterranean maritime museums database (Bellio, Rosin et al. 2023);
2. Definition of a maritime museum matrix (offer) classifying museums into four categories;
3. Definition of a visitor matrix (demand) classifying visitors into four clusters;
4. Content and sentiment analysis through Atlas.ti software and ChatGPT on TripAdvisor reviews (Soratto, Pires et al. 2020, Smit 2021).

- **Atlas.ti**

Atlas.ti is a CAQDAS (Computer-Assisted Qualitative Data Analysis Software) used for qualitative data analysis in many research fields (Flick 2009; Friese 2014), providing greater data management security and reducing manual tasks (Friese, Soratto et al. 2018). The purpose of qualitative research is to provide a rich understanding of a phenomenon by presenting in-depth findings (Zakaria and Zakaria 2016).

- **ChatGPT**

ChatGPT (Generative Pretrained Transformer) is an advanced AI system for processing large amounts of text and understanding the structure of language (Castillo-González, Lepez et al., 2022, Phillips, Saleh et al., 2022). It is considered one of the most advanced systems available on the public market, openly accessible and trained on a wide variety of data (Goyal, Li et al. 2022). These systems significantly improve existing textual analysis approaches (De Kok 2023). While being a relatively new technology, several papers have already applied ChatGPT to model the sentiment of disclosures (Lopez-Lira and Tang 2023). The rapid emergence of these working papers and their impact highlights the relevance of the GPT methodology as well as its applicability to a wide range of problems and data (De Kok 2023).

Main Results

1. A Euro-Mediterranean maritime museums database (Bellio, Rosin et al. 2023) was created. The final sample is comprised of 221 Mediterranean Maritime Museums distributed across 13 different countries.
2. Definition of the maritime museum matrix (offer). Starting from the database created in the first phase, museums were classified into four categories. A matrix was drawn (see figure 1), including the following two features that emerged in literature as previously explained:
 - the museum's approach in terms of local versus national;
 - level of proactivity. A proactivity index was calculated for each museum in the database given by the weighted sum of the variables "activities carried out," "communication & engagement," and "visibility." Activities carried out is given by the sum of: children's activities, youth activities, adult activities, senior citizen activities, number of exhibitions in one year, online virtual activities, and offline virtual activities. These are all binary variables (1=present, 0=not present), except for the number of exhibitions, which is reported precisely. Online virtual activities are defined as all those experiences that can be lived by the visitor online, when not in the museum, such as virtual tours or descriptive videos of what is on display in the rooms. Offline virtual activities are defined as all those virtual experiences that take place on-site, inside the museum, such as multimedia tours, use of augmented reality, etc. They differ from the item "virtual collection," which instead refers, for example, to the virtual reconstruction of artifacts, such as 3D shipwrecks. Consultation of the museum's website and social pages, particularly Facebook, has been crucial in gathering this information. Communication & engagement is the sum of the number of social platforms (i.e. Instagram, Facebook, Twitter, and YouTube, etc.) on which the museum is present. Visibility is expressed in the number of followers present on the main social platforms, indicating with "0" the museum's absence on a platform. The normalized variables are added together to obtain the proactivity index, which together with the type of collection (local/national) allowed for the completion of the matrix dividing the surveyed museums into four categories as follows:
 - 1st local museums with high proactivity (44)
 - 2nd national museums with high proactivity (29)
 - 3rd local museums with low proactivity (59)
 - 4th national museums with low proactivity (45)



Figure 1: Museums' matrix

3. Definition of a visitor matrix (demand). To deepen the analysis on the visitors' side, they were divided into four clusters (or groups) according to their commitment and level of interest toward

maritime culture and their museum visit frequency as shown in figure 2. To obtain this information, reviews published on TripAdvisor referring to the museums included in our database were downloaded and content analysis was performed. Commitment toward maritime culture was assessed by analyzing reviews for each museum, in all languages, proceeding from most recent to the oldest. Reviewers were divided between committed (1) and not committed (0). Results were included in an Excel file, devoting a column to each of the variables that define a review (name of reviewer, number of contributions, exact number of reviews, number of stars, period of visit and with whom visited [the latter two pieces of information are not always available], title of review, textual content, commitment). A reviewer was considered to be "committed" when: • Reviews contain a direct expression of interest; • The reviewer recommends people who are passionate about the sea and maritime culture to visit the museum, rating it highly (4/5 stars); A reviewer was considered "not committed" when: • Reviews contain a direct manifestation of disinterest; • The reviewer advises people who are passionate about the sea and maritime culture to visit the museum, rating it very negatively. It means that those who visited the museum felt that they did not have the appropriate knowledge to appreciate it and therefore recommended its visit to those with such knowledge. In the case of reviews with 3 stars, being neutral, they were retained only when it was possible to tell from the text whether the reviewer's opinion of the visit was positive or negative.

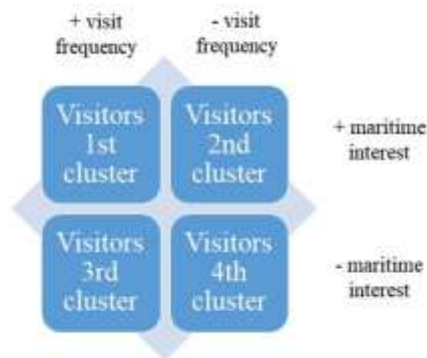


Figure 2: Visitors' matrix

The number of useful reviews to be reached for each category was defined through a logarithmic scale, taking into account both the minimum threshold dictated by the first category (the one with the lowest total number of reviews available among the four), and the variability in the number of reviews that could be analyzed (from 2,331 reviews for the first category, to 19,436 for the fourth category). For the 1st category, 131 useful reviews were found; this value corresponds to our minimum threshold. Starting from the 1st cluster, the \log_{10} of the total number of available reviews was calculated, i.e., $\log_{10}(2331) = 3.37$.

- 1st cluster = 131
- 2nd cluster $\rightarrow 38.9 \log_{10}(3471) = 138$
- 3rd cluster $\rightarrow 38.9 \log_{10}(5461) = 145$
- 4th cluster $\rightarrow 38.9 \log_{10}(19436) = 167$

In this way, setting 131 as the number of useful reviews for the 1st category, the 2nd, 3rd, and 4th categories should have: 138, 145, and 167, respectively. The frequency of museum visits was calculated by analyzing for each useful reviewer (i.e., committed or not committed) the number of museums reviewed out of the total number of reviews left, to calculate the percentage of the total. For each review, the textual content was also analyzed, pointing out when the frequency or conversely non-frequency of visitation emerges from the textual analysis. An Excel file was created with the following columns: reviewer name, interest, total number of reviews, number of museum reviews, assiduity in percentage, what emerges from the textual content versus assiduity. Frequency was reported by calculating the number of museums seen as a percentage of the total, through the formula: The assiduity could be calculated effectively for:

- 107 reviewers (1st)

- 123 reviewers (2nd)
- 145 reviewers (3rd)
- 167 reviewers (4th)

Final results of museums' and visitors' matrices (phases two and three) are reported in Figure 3.



Figure 3: Correlation analysis between museums' categories and visitors' clusters

- Content and sentiment analyses through Atlas.ti software and ChatGPT on TripAdvisor's reviews. The reviews considered in the previous phase were further explored. Comments in English and Italian were selected to perform the analyses. The final total number of considered reviews is 385.

The museum reviews were coded through Atlas.ti 24. The content analysis was performed separately for each category of museums, repeating the same analyses to obtain comparable results between categories. Table 1 highlights that the most important items in the overall evaluation of the visitors refer to the collection of the museum (370 positive, 108 negative), the fact that the museum is perceived for maritime experts' visitors (177) or not for experts (31), and the quality of the display (positive 94, negative 66). These items, as they are mentioned more frequently than other items, tend to play a major role in influencing the e-Wom valence. Items with low levels of occurrence (<10) were not considered in Table 1.

	CAT 1 Local high proactivity	CAT 2 National high proactivity	CAT 3 Local low proactivity	CAT 4 National low proactivity	Totals
● Building-	8	4	5	4	21
● Building+	2	6	6	22	36
● Collection-	33	28	28	19	108
● Collection+	66	50	115	139	370
● Display-	13	13	22	18	66
● Display+	20	18	16	40	94
● Duration-	6	2	5	8	21
● Duration+	2	1	18	11	32
● Educational+	2	0	8	10	20
● Engagement+	5	2	3	6	16
● Layout+	4	6	8	16	34
● Location+	4	2	9	8	23
● Museum4expert-	7	5	11	8	31
● Museum4expert+	45	23	57	52	177
● Price+	13	6	20	28	67
● Staff-	0	7	2	2	11
● Staff+	13	3	18	1	35
Totals	253	183	365	397	1198

Table 1 - Main items co-occurrence frequency

From a closer look at Table 1, it is possible to observe that museums with low proactivity tend to be appreciated for the quality of their collection, are perceived as more suitable for visitors that are experts in the maritime field, and the price is very affordable, especially considering what is offered by the museum. In general, the staff seems to be particularly appreciated in local museums rather than in national ones. In national museums with low proactivity, the role of curators and their attention to the visitors' experience appear to be particularly relevant (Display+ 40).

The TripAdvisor comments were then analyzed using ChatGPT. ChatGPT was trained to act as a researcher (Koch 2023). To conduct the textual analysis, a five-step framework was used as suggested by De Kok (2023): 1 - Definition and understanding of the problem; 2 - Decision on the approach and model to adopt; 3 - Development of the prompt; 4 - Evaluation of the construct validity; 5 - Running of the predictions and parsing results. For each group of comments referring to the four categories, a detailed sentiment analysis was conducted to identify the prevailing emotions and attitudes expressed by the visitors, categorizing them into positive, negative, and mixed. In addition to sentiment analysis, a content analysis to extract key themes and narratives from the comments was also performed.

Based on the data presented in Figure 2, a comparison across the four sets, searching for similarities and main differences in terms of emerged topics is obtained.

Similarities:

- Exhibit Quality and Variety: All sets consistently highlight the importance of high-quality and varied exhibits. Visitors value well-maintained displays and diverse collections, including models, artifacts, and interactive elements.
- Educational Value: Each set of comments emphasizes the educational aspects of the museums. Visitors appreciate the historical insights and cultural information provided, which enhance their overall experience.
- Visitor Experience: Positive visitor experiences are a common theme across all sets. Helpful staff, well-organized exhibits, and engaging displays contribute to positive sentiments.
- Cultural and Historical Significance: Exhibits tied to local or national maritime history receive high appreciation. Visitors value the context and depth provided by culturally significant displays.

- Value for Money: Affordability and value for money are consistently mentioned positively. Visitors appreciate the balance between cost and the quality of the experience.

Differences:

- Specific Feedback on Accessibility and Layout: Sets 2 and 3 contain more mixed feedback regarding accessibility and layout issues compared to Sets 1 and 4. This indicates a need for improvements in these areas to enhance visitor satisfaction.
- Personal Connections and Experiences: Set 2 had more comments reflecting personal connections to the exhibits, such as family history or personal interests in maritime activities. This highlights the importance of relatable exhibits in enhancing visitor satisfaction.
- Detailed Descriptions of Artifacts: Set 4 includes more detailed descriptions of specific artifacts and interactive elements compared to the other sets. This suggests a higher level of engagement and appreciation for the detailed information provided.
- Mixed Sentiments on Educational Value: While educational value is generally appreciated, Set 3 had a slightly higher number of mixed sentiments. Some visitors felt the need for better explanations and context for certain exhibits, indicating room for improvement in interpretative materials.

In conclusion, the separate analysis of the four sets of comments reveals several consistent themes that contribute to positive visitor experiences at maritime museums. High-quality and varied exhibits, strong educational value, positive overall visitor experiences, cultural and historical significance, and good value for money are key drivers of satisfaction. Differences between the sets highlight areas for improvement, such as accessibility, exhibit layout, and the provision of detailed contextual information. Addressing these areas can further enhance visitor satisfaction and ensure a consistently positive experience across all museums.

The same analyses were then conducted on the four categories together to obtain a comparison between them:

- **Category 1 - Positive Experiences and Satisfaction:** The comments were predominantly positive, with a strong emphasis on satisfaction and positive experiences. Key themes included high-quality service, friendly staff, and enjoyable activities. The sentiment analysis showed a high percentage of positive comments, reflecting a generally favorable perception of the experiences discussed.
- **Category 2 - Constructive Feedback and Suggestions:** Comments were a mix of positive and constructive feedback. While there were many positive remarks, commenters also provided suggestions for improvement. Common themes included the desire for more diverse activities, improvements in specific areas of service, and suggestions for enhancing the overall experience. The sentiment analysis revealed a balanced distribution of positive, negative, and neutral sentiments.
- **Category 3 - Critical Feedback and Issues:** Comments were more critical, highlighting various issues and areas of dissatisfaction. Key themes included poor service quality, negative experiences with staff, and specific complaints about the facilities. The sentiment analysis indicated a higher percentage of negative comments, reflecting the overall dissatisfaction within this group.
- **Category 4 - Mixed Experiences and Neutral Feedback:** Comments reflected a mix of experiences, with an equal distribution of positive, negative, and neutral feedback. Common themes included varied experiences with different aspects of the service, mixed opinions on the quality of activities, and general remarks about the overall experience. The sentiment analysis showed a balanced sentiment distribution, indicating a diverse range of experiences and perceptions.

Conclusions

This study makes significant contributions to the literature on cultural value creation and visitor segmentation, providing actionable insights for managers, scholars, policymakers, and practitioners. By examining the interplay between demand and offerings in Mediterranean Maritime Museums, the study employs a qualitative approach supported by Atlas.ti software and AI tools like ChatGPT. This innovative methodology highlights the potential of AI in research, suggesting new avenues for future studies and emphasizing the synergy between artificial and human intelligence for optimal research outcomes. To our knowledge, this is the first study to:

- Employ this perspective,
- Apply it to a specific category of museums,
- Cover a broad geographic area,
- Clearly cluster visitors based on satisfaction derived from e-Wom valence,
- Link visitor clusters (demand) with identified museum categories (offer).

Additionally, the research advocates for using e-Wom for a priori customer segmentation. This model can be generalized and applied to various cultural and non-cultural contexts, particularly where:

- There are numerous online reviews;
- Behavioral and psychographic variables are pertinent (e.g., usage intensity, attitude);
- Idiosyncratic differences exist.

The model can be tailored by adjusting the matrix variables to suit the specific business context. By clustering visitors according to their satisfaction levels, we can derive practical managerial guidelines to help museums identify target audiences and attract new visitors effectively. The recommendations for Museum Management include:

- Enhance Multilingual Support: Offering exhibit information and guided tours in multiple languages can significantly improve accessibility for international visitors;
- Modernize Displays: Updating presentation styles with interactive and multimedia elements can make exhibits more engaging, particularly for younger audiences;
- Improve Signage and Information: Clearer, more detailed signage and educational materials can help visitors better understand the significance of exhibits;
- Promote Unique Features: Highlighting unique aspects of each museum, such as special artifacts or historical anecdotes, can attract more visitors and set realistic expectations;
- Engage Local Communities: Involving local communities through events and volunteer opportunities can create a more vibrant and supportive environment.

By examining sentiment distribution and content, we gained insights into visitors' overall perceptions and experiences. This involved identifying positive, mixed, and neutral tones, frequently used words and phrases, and central topics and themes. Summarizing these themes and narratives allowed us to construct a comprehensive overview of key discussion points and issues most relevant to each group.

In conclusion, the comprehensive content and sentiment analysis conducted on the four groups of reviews provided valuable insights into visitor perceptions and experiences. These insights enable

us to extract meaningful themes and narratives, offering a deeper understanding of the sentiments and issues emerged within each group of visitors. The findings can inform future improvements and enhancements, ensuring a better overall experience for all visitors and supporting positive e-Wom. To enhance accessibility and expand their audience base, museums must understand how to offer valuable and enjoyable experiences to a diverse audience. Customer orientation does not mean compromising a museum's mission and integrity to meet prospective audience demands. Instead, museums can balance their aims and duties with audience needs.

These results are preliminary. Further limitations include the variability in visitor perceptions based on preferences, backgrounds, and prior experiences. Additionally, the study relies solely on TripAdvisor reviews, which may be influenced by the platform's user demographics and review policies. Future research should explore broader data sources to mitigate platform-specific biases and consider longitudinal studies to track changes in visitor perceptions over time. Expanding the geographic scope and including diverse types of museums can further validate and refine the proposed model. Integrating quantitative methods could also enhance the robustness of the findings, providing a more comprehensive understanding of visitor experiences and expectations.

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