



ANALYSIS OF VISITORS' OPINIONS ON ROMANIAN MUSEUMS' ACTIVITIES



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ABSTRACT

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Romanian museums have a rich cultural heritage that is intrinsically valuable to its citizens, however, the number of visitors has been decreasing in recent years as individuals prefer to visit more dynamic and more effectively promoted tourism and cultural establishments. An interactive presence on social media can switch the attention of different cohorts as well as provide a space where people feel free to express their feelings and opinions and thus could also influence the decisions of others in regards to visiting these cultural heritage establishments. This article investigates 1,790 comments posted on Facebook from January to June 2021 by visitors of the Romanian museums to find the emotional responses regarding their experiences. R software delivered the text mining results, sentiment scores, and emotion classifications. In addition, the EViews software was used to produce images regarding the relationships between emotions and sentiments. As a result, we have found that the visitors expressed favorable emotional responses to the Romanian museums' activities.

Contribution/Originality: The analysis highlights the emotions and the sentiments related to the visitors' experiences of the Romanian museums. The results might be used as helpful management tools for institutions to develop the cultural heritage product, target consumers more effectively, and come closer to their preferences and desires regarding the enrichment of their cultural knowledge.

1. INTRODUCTION

Museums hold important testaments and talismans of the history of any nation, presenting various perspectives which can trigger different emotions in visitors. Their role is to delicately preserve the tangible and intangible heritage that makes a culture unique. Nowadays, technology allows museums to make their exhibits even more available, although virtual exhibitions cannot replicate the experience of observing real/original heritage goods and thereby the emotional and informational value of a personal visit. There are cases, however, where it can enhance the visitors' experience and attract new ones.

Technological evolution can influence museums' development, for example, the production of digital exhibits, which allows a museum to improve the visitor experience and provide access to additional materials to deepen knowledge and engagement. On the other hand, the online presence of visitors on social media and the activity of sharing the experience on museums' sites significantly impact other visitors' opinions and museums' activities. Because of this, managers should try to use the opinions of online visitors to improve the services offered by the museums.

This article uses sentiment analysis to identify visitors' perceptions of Romanian museums. Also, a regression analysis is developed. The data is collected from museums' profiles on Facebook.

The paper is structured as follows. The next part represents the literature review section, discussing technology's impact on museum activities and the use of the social networks by museums and visitors. Section three highlights the evolution registered by museums, emphasizing the current trend in their transformation, and also presents statistical data regarding Romanian museums. Section four represents the methodology used in the analysis. Section five contains a discussion of the results. The final section concludes the paper.

2. LITERATURE REVIEW

2.1. *The Technology Adopted by the Museums*

Computer-generated art has existed in various types since the 1960s, when the first digitally created works were displayed in Stuttgart and New York (Lambert, 2019). Nowadays, such technologies (e.g., virtual reality) are increasingly adopted into the everyday activities of museums. One reason for this is that technology can improve the presentation of museum exhibits, providing new ways to attract visitors of all ages, as well as our fundamental understanding that technology has profoundly influenced modern society, paving the way for new ways of working, communicating, and investigating heritage products and services (Borowiecki, Forbes, & Fresa, 2016). The way people search for information has changed significantly in the digital age. Young people become co-creators, co-authors, and co-producers of digital content, initiating the transition from interactive technologies to a participatory culture (Research Project Riches, 2019).

The digital environment supports the capitalization of cultural heritage. New and diversified cultural products can be created, and new experiences developed. Users can create their virtual collections and study stories related to cultural goods. Due to the field's novelty, the differences in themes, scope, and tradition in museums and the interdisciplinary nature of the design of digital applications for exhibitions and museums make it difficult to formulate general design guidelines. One success factor is using a team of professionals with well-established roles, trust, and communication (Ruttkay & Bényei, 2018).

The use of information and communications technology (ICT) in the cultural heritage field covers a wide range of applications: word processing software, data processing software, and material analysis applications for archaeological research and conservation (Giannoulis-Giannouloupoulos, 2012). ICT research is important for change as it encourages innovation and creativity, contributing to the interaction of people and institutions around the globe (Bowen & Giannini, 2019).

Technology has led to institutional and sectoral changes that impact the roles and relationships between organizations and the public and has allowed for the reassembly of museums' processes, practices, and so on (Parry, 2019). There is no one-size-fits-all solution or method for preserving digital art, however, this process is determined by the characteristics of the work of art and its relationship with the technologies used in its creation (Falcão & Ensom, 2019).

Both onsite and online exhibitions use advanced technologies which help connect experiences (Giannini & Bowen, 2019a). In order to reach a wider audience, social networks are used to exchange information and raise awareness of current and future exhibitions and activities (Giannini & Bowen, 2019b). A museum's principal purpose is to promote and share information, transparency, inclusion, diversity, communication, and access to knowledge (Giannini & Bowen, 2019c). Museums are in dynamic real-time communication with communities and audiences. The visitors use emails, texts, tweets, Facebook, blogs, YouTube, videos, and photos to share thoughts, feelings, and museum experiences (Giannini & Bowen, 2019b).

2.2. The Connection Between Social Media and the Museums

The information posted on the museums' social media profiles can significantly influence their activities. Effective use of social media can positively influence the way museums communicate with visitors and can help create relationships with communities both local and foreign. An essential part of the literature is the connection between cultural institutions and social media, and this connection is seen from two perspectives. On the one hand, cultural institutions create well-maintained profiles on social platforms and communicate with visitors to develop loyalty. On the other hand, visitors use social media platforms to post their own opinions (either positive or negative) about the activity of cultural institutions, influencing other visitors.

Maurer (2011) analyzed visitors' statements about museums and similar organizations and discussed why these statements are important for museums to understand how to adapt and develop their practices. Theocharidis, Nerantzaki, Vrana, and Paschaloudis (2014) investigated the quantity and type of information provided by museums' websites and the use of social media (Facebook, specifically). The authors' results show the limited use of the web and social media applications. Zafiroopoulos, Vrana, and Antoniadis (2015) analyzed the museums' activity and their Facebook and Twitter accounts. The authors investigated whether Twitter compares to Facebook use and the results reveal that there is a group of museums with a presence on both social media. Lazzeretti, Sartori, and Innocenti (2015) discussed the role of social networks within the communication activities of museums and analyzed the intensity of the museums' interactions with their stakeholders on Facebook and Twitter.

Vassilakis et al. (2017) examined how social media is linked to the museum user experience, paying particular attention to the importance of interaction between users and its impact on the visits to the museum. Sundjaja, Gaol, Abdinagoro, and Abbas (2017) analyzed museums' visitors' behavior and the museums' adoption of social media technologies, showing that visiting purposes involve learning about culture, relaxation, and personal desires. Vlachvei and Kyparissis (2017) investigated the role of social media (Facebook specifically) in museums' marketing and communication strategies, emphasizing museums' focus on promotion, communication, and word of mouth. Ozdemir and Çelebi (2017) discuss social media (Facebook specifically) use within museums' activities, emphasizing the importance of a social media account maintenance and how it is used to garner interest and engagement of the followers.

Waller and Waller (2019) analyzed the key areas of negative comments on Facebook regarding art museums to find how institutions monitor criticism. Amanatidis, Mylona, Mamalis, and Kamenidou (2020) examined the use of Instagram accounts by museums and underlined how these profiles are used for reaching out to visitors and what public response is to this type of communication. Romolini, Fissi, and Gori (2020) analyzed museums' use of social media to boost visitor engagement and found that the level of engagement in museums is quite absent.

Zollo, Rialti, Marrucci, and Ciappei (2021) investigated the importance of new technologies, digitalization, and ICT for museum managers/marketers to improve loyalty and found that digital experiences and the online presence of museums are significant predictors of loyalty. Ryder, Zhang, and Hua (2021) analyzed what types of digital content cultural institutions (museums, zoos, aquariums, performing arts organizations, heritage foundations, and historical societies) implemented during temporary closures due to the COVID-19 pandemic and their effects on social media (Instagram and Facebook) engagement. According to the authors, these institutions implemented digital content to build communities.

The online presence of the museums is essential for their development and is the reason for the recommendation that the content on social media and museum websites be updated regularly. It is also necessary for museum employees to be provided with ICT skills and technical knowledge in order to be able to develop content on social media and institution websites as well as to adopt new and interesting ways of publishing the content, especially to younger audiences.

3. THE EVOLUTION OF MUSEUMS

The presentation of exhibitions has developed over time, particularly during the digital age. Nowadays, visitors can choose whether they want a physical presence in a museum. Technology strongly influences how museum activities are carried out as well as the way the museum interacts with visitors.

3.1. *The Current Trend in Museums' Transformation*

Museums are evolving their role from heritage holders to spaces dedicated to education and entertainment. Technology facilitates the changes behind this evolution by providing museums with the means to create engaging presentations for effectively communicating with visitors. Museums can use text, images, video, sound, interactive 3D graphics, and feedback integrated into an exhibition's context. In more recent years, multimedia techniques have been widely used to improve the user experience, attract more visitors to museums, and provide a new means of exhibiting their content and information.

In museums, visitor satisfaction can be influenced by various aspects such as culture, uniqueness of the exhibits, and the services the accompanying guides offer. However, it should be that poor execution of the exhibits, poor services provided by the museum, operating hours, inadequate information, and the lack of attractions in the museum can result and often does result in customer dissatisfaction (Mavragani, 2018).

As digitization has become of particular interest in the European Union (EU), The Digital Agenda for Europe was conceived as one of the seven pilot initiatives of the Europe 2020 Strategy (European Union, 2010) defining the key roles that the use of ICT will have to play in achieving the targets. Digitization of cultural heritage and supporting its economic use are activities promoted by the Digital Agenda for Europe, drawing attention to the need to improve access to cultural content even in the most remote areas. Furthermore, digitization is essential in improving access to and re-use of cultural heritage for educational and economic purposes, increasing the integration of cultural heritage into digital services and products, and finally, creating and increasing the number of jobs.

Digitization usually refers to the generation of a copy of an original heritage good, e.g., scanning an archive document or digital image of a painting. In addition, digitizing information (such as size, title, and description) resulting from previous documentation (e.g., from the archive) helps identify, describe, understand, and capitalize on heritage.

The European Commission recommended that the Member States adopt measures in digitization, online accessibility, and digital preservation of cultural goods, as well as cooperating with and involving the private sector in the process in order to increase the online accessibility of Europe's cultural heritage and stimulate the development of European industries (Commission Recommendation 2011/711/EU). Directive 2013/37/EU (amending Directive 2003/98/EC) establishes the general principle that documents in libraries, museums, and archives are reusable for commercial and non-commercial purposes and promotes availability in an open format that can be automatically read with metadata and use open standards. The EU Work Plan for Culture 2015-2018 emphasized the need to digitize cultural content. Another argument for digitization is that digital services could foster the expansion of trans-European tourism networks (Conclusions of the Council and the Representatives of the Governments of the Member States, 2014/C 463/02).

The economic dimension of the New European Agenda for Culture aims to boost culture-based creativity in education and innovation, as well as for jobs and growth. Culture and tourism are strong drivers of economic activity. In rural areas, the modernization and restoration of cultural and natural heritage often contribute to the area's economic growth and sustainability (European Network for Rural Development, 2016).

Technology has an important impact on the production, conservation, and use of cultural heritage. Digitization and the Internet are influencing the activities carried out by the institutions. The influences are on the use, the capitalization of cultural heritage, and conservation costs. Technology has also helped to manage the acquisition,

exchange, and exhibition of heritage goods using digital catalogs. Increased digitization of goods, combined with the spread of the Internet connection, can reduce access costs, thus overcoming geographical and time constraints.

3.2. Statistical Data on Museums from Romania

Between 1990 and 2020, the number of museums in Romania increased by 69.6% from 450 units in 1990 to 763 units in 2020 (see Figure 1). Despite this, moments of decline include in 1992 when the number of museums fell by 4.9% compared to 1990. In 2010, the number of museums also fell by 1% compared to 2009. 2012 marked the sharpest decrease of 6.5% compared to 2011, from 709 units to 663. In 2014, the fall was 1.5% compared to 2013, and in 2020, the fall was 3.5% compared to 2019.

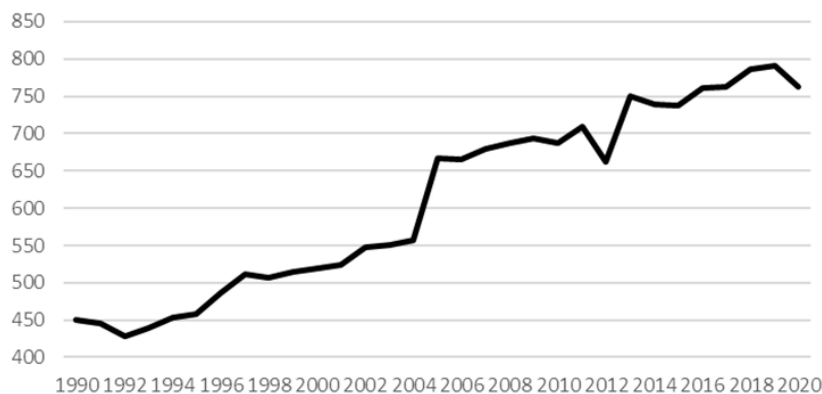


Figure 1. The number of museums in Romania, 1990-2020 (no. of units).

Between 1990 and 2019, the number of visitors to museums and public exhibits in Romania increased by 73.1%, from 10.5 million people in 1990 to 18.2 million in 2019 (see Figure 2). There were decreases in the number of visitors in 1991, 1992, 1994, 1999, 2003, 2006, 2010, and 2014. The most significant reduction was in 2020, amid restrictions triggered by the COVID-19 pandemic.



Figure 2. The visitors to museums and public collections in Romania, 1990-2020 (millions of persons).

Nowadays, museums often offer virtual tours in Romania, such as the National Museum of History of Romania, the National Museum of Art of Romania, the National Museum of Contemporary Art, Grigore Antipa National Museum of Natural History, the National Museum of Romanian Literature, Dimitrie Leonida National Technical Museum, the National Museum of the Romanian Peasant, and Dimitrie Gusti National Village Museum.

4. METHODOLOGY

This study developed the sentiment analysis using R software and packages:

- Tm (for text mining operations, such as removing numbers, special characters, punctuations, and stop words, such as “the”, “is”, and “are”).

- Snowballe (for reducing words to their base/root form, for example: reducing the words “hunting”, and “hunter” to “hunt”).
- Wordcloud (for word cloud plot generation).
- RColorBrewer (for obtaining color palettes for plots).
- Syuzhet (for sentiment scores and emotion classification), and ggplot2 (for plotting graphs).

An important part of the study focuses on analyzing the relationships between emotions and sentiments using EViews software.

The analysis focuses on the comments of Romanian museum visitors posted on Facebook to identify their perceptions about museums’ activities. Tables and graphs help analyze and interpret the emotions and sentiments detected in the comments. The data used in the current investigation is related to the period between January and June 2021. The authors managed to gather 1,790 comments related to following museums from Romania: Dimitrie Gusti National Village Museum (100), National Museum of the Romanian Peasant (294), National Museum of Romanian History (85), Grigore Antipa National Museum of Natural History (81), National Museum of Art of Romania (84), King Ferdinand I National Military Museum (94), Cotroceni National Museum (2), National Museum of Geology (28), National Museum of Romanian Aviation (22), National Museum of History of Transylvania (9), George Enescu National Museum (66), Peles National Museum (20), National Museum of Romanian Literature (200), Bran National Museum (23), Astra National Museum Complex / Astra Museum in Sibiu (180), Neamț National Museum Complex, Piatra Neamț (39), National Philatelic Museum, Bucharest (21), National Museum of Agriculture, Slobozia (21), Museum of Viticulture and Pomiculture, Golești (6), Palace of Culture in Iași / Moldova National Museum Complex (26), National Museum of the Romanian Navy, Constanța (7), Banat National Museum, Timișoara (184), National Museum of Bukovina (17), Suceava History Museum (17), Suceava Princely Fortress (16), Museum of Natural Sciences, Suceava (14), Princely Inn Ethnographic Museum, Suceava (17), Bukovina Village Museum (51), National Museum of the Union, Alba Iulia (4), National Museum of Romanian Literature, Iasi (12), Brătianu National Museum, Ștefănești (7), National Museum of Maps and Old Books, Bucharest (27), and Brukenthal National Museum, Sibiu (16).

5. RESULTS

This section contains the results. The steps are: loading the text file (with visitors’ comments) in R, cleaning the data, then performing the analysis. The text cleaning refers to the removal of the special characters such as unnecessary space, stop words, numbers, and punctuation. The software also converts text to lowercase and the words to root form.

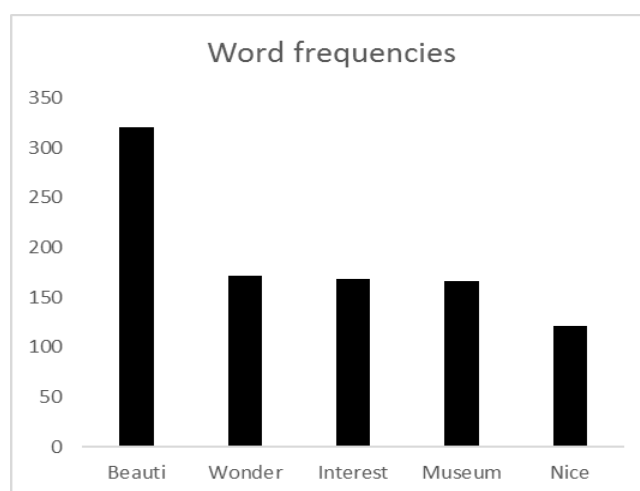


Figure 3. Top 5 most frequent words used in visitors’ comments on Facebook.

The second assesses the impact on negative sentiments (see Table 3). Two emotions (anticipation and surprise) are present in both models.

Table 1. The occurrences of words associated with emotions/sentiments.

No. of the row	Anger	Anticipation	Disgust	Fear	Joy	Sadness	Surprise	Trust	Negative	Positive
1	1.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000
2	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	1.000
3	0.000	1.000	0.000	0.000	1.000	0.000	1.000	1.000	0.000	1.000
4	1.000	3.000	1.000	1.000	2.000	2.000	2.000	2.000	1.000	3.000
5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
6	0.000	1.000	0.000	0.000	1.000	0.000	1.000	1.000	0.000	1.000
7	0.000	0.000	0.000	0.000	1.000	0.000	1.000	1.000	0.000	1.000
8	0.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	1.000
9	0.000	2.000	0.000	0.000	2.000	0.000	2.000	1.000	0.000	2.000
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
11	0.000	2.000	0.000	0.000	2.000	1.000	0.000	2.000	1.000	2.000
12	0.000	1.000	0.000	0.000	1.000	0.000	0.000	2.000	0.000	4.000
13	0.000	0.000	0.000	0.000	1.000	0.000	1.000	1.000	0.000	1.000
14	0.000	1.000	0.000	1.000	2.000	1.000	1.000	2.000	0.000	3.000
15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000

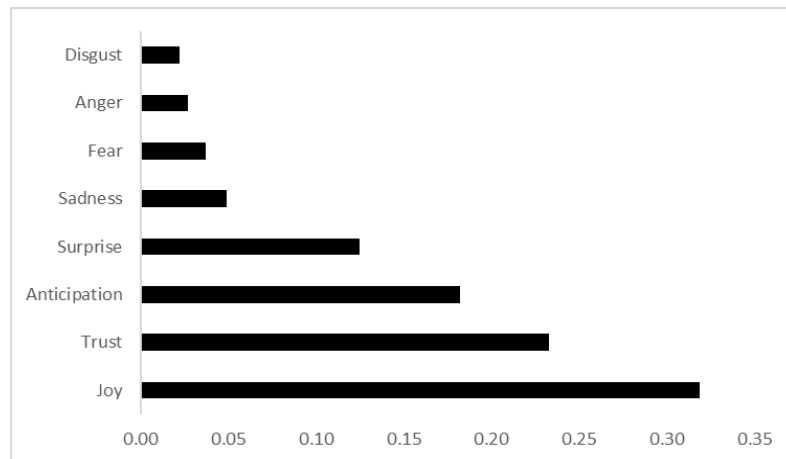


Figure 5. The count of words in the text, associated with each emotion (%).

Table 2. Model no. 1: The impact of emotions on positive sentiments.

Dependent Variable: POSITIVE				
Method: Least Squares				
Sample: 1 897				
Included observations: 897				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ANTICIPATION	0.172	0.044	3.871	0.000
JOY	0.517	0.043	11.968	0.000
SURPRISE	-0.028	0.056	-0.511	0.610
TRUST	0.660	0.037	17.650	0.000
C	0.623	0.041	15.191	0.000
R-squared	0.634	Mean dependent var		1.726
Adjusted R-squared	0.632	S.D. dependent var		1.401
S.E. of regression	0.850	Akaike info criterion		2.518
Sum squared resid	643.991	Schwarz criterion		2.544
Log likelihood	-1124.168	Hannan-Quinn criter.		2.528
F-statistic	385.942	Durbin-Watson stat		2.105
Prob(F-statistic)	0.000			

Table 3. Model no. 2: The impact of emotions on negative sentiments.

Dependent Variable: NEGATIVE				
Method: Least Squares				
Sample: 1 897				
Included observations: 897				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ANGER	0.464	0.046	10.141	0.000
ANTICIPATION	0.052	0.018	2.962	0.003
DISGUST	0.379	0.050	7.569	0.000
FEAR	0.370	0.042	8.797	0.000
SADNESS	0.304	0.038	8.106	0.000
SURPRISE	-0.007	0.023	-0.306	0.759
C	0.027	0.016	1.741	0.082
R-squared	0.600	Mean dependent var		0.219
Adjusted R-squared	0.597	S.D. dependent var		0.593
S.E. of regression	0.376	Akaike info criterion		0.891
Sum squared resid	126.017	Schwarz criterion		0.928
Log likelihood	-392.545	Hannan-Quinn criter.		0.905
F-statistic	222.653	Durbin-Watson stat		1.926
Prob(F-statistic)	0.000			

The results show that comments relating to trust, joy, and anticipation are statistically significant, while comments related to a feeling of surprise are not statistically significant. When analyzing the relationship between negative sentiments and emotions, the results show that anger, anticipation, disgust, fear, and sadness are statistically significant. At the same time, comments related to feelings of surprise are not statistically significant. The results show that “anticipation” is an important emotion for both types of sentiments (positive and negative), but “surprise” does not influence either positive or negative ones.

6. CONCLUSIONS

According to the results, visitors are impressed by museums’ exhibits and the stories provided, as they consider them beautiful, wonderful, and interesting. Through their interaction with the Romanian museums, visitors experience emotions such as joy, trust, and surprise. However, the main problems encountered by visitors are outdated information, online booking systems, translations, interpretations, and lack of virtual tours, which generate negative emotions such as sadness or anger. Understanding visitors’ perceptions about Romanian museums can be helpful for the managers of these institutions, providing support for the development of museums’ future activities. Future research might consider the analysis of other social media platforms (e.g., Twitter). The present study contributes to the literature by providing a focused sentiment analysis of Romanian museums. The results may aid in influencing areas when developing new services for visitors. However, the study has some limitations related to choosing the Romanian museums for analysis. Future research should consider this aspect with a proper methodology.

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