

## RESEARCH ARTICLE

# The influence of visitor-based social contextual information on visitors' museum experience

Nemceva V. Valeria<sup>1</sup>

Daria A. Lukonina<sup>1</sup>

Alisa V. Chernova<sup>1</sup>

Abdul Murid Barna<sup>2</sup>

Shaikh Mohammed Farhan<sup>2</sup>

<sup>1</sup>Arts and Culture Management, HSE, Saint-Petersburg;

<sup>2</sup>International business, HSE, Saint-Petersburg,

---

## Abstract

The work is based on the analysis of the perceptual interconnections involved in the visitor and customer experiences at the exhibition. Despite being a researchable topic in recent studies, it still lacks precision science factors that have a significant impact on visitors' emotional responses depending on the research sphere proposed. However, they indicate that the background of a particular person will influence his or her "black-box" experience, relying on external forces as well. Since technological innovations are nowadays welcomed in museums, it is proposed to research emotional responses to particular exhibits and draw conclusions about the preferences of people. Thus, research questions are how the educational background of a person effects the communication the of information about art and what is the basis of the emotional response to art. The work is based on quantitative data which is analysed through Chi-Square test, Welch Test, K-Means clustering, and ANOVA. It is estimated that the results show a high correlation between emotional response and comments being somehow related to the need to satisfy a need for communication and emotional exchange noticed by behaviourists. Moreover, based on our emotion investigation, it is presumed that art major students have better emotional intellect and are more interested in quantitative data while analyzing an exhibition and artwork than quantitative data featured as numbers in an application. The data for this analysis was retrieved from an article that focused on the Korean people's investigation and the assessment of their customer experience on the Likert scale.

## Keywords:

museum, customer experience (CX), exhibition, visitor experience, technology innovation

---

## 1. Introduction

The arts and culture sphere is an abnormally complex phenomenon because it evaluates two dimensions: the economic dimension, which is the financial and highly rationalized process, and the intangible dimension, which includes emotional state analysis and art affecting people and their perception. The most problematic among them is the second dimension, which involves a diverse methodological spectrum and is more flexible and changing in comparison with the economy-related analysis. Perception is primarily an individual process; however, many researchers attempt to generalize the effects of cultural and arts events on viewers and participants in order to identify tendencies and implement changes and adjustments to improve the customer

experience (CX) while a customer is in contact with art. Many psychological and social-science approaches are implemented in the research of CX.

There are diverse cultural institutes, but the focus of the current study is related to museums and exhibitions held there. It is to be noticed that, on the one hand, museums represent a unique conservation of antique and ancient items and articles that form the heritage of past events. On the other hand, they represent the modernity of the present day with the tools and techniques that have evolved. Such novelties put into practice at various levels are referred to as innovations. They may be spotted on different levels.

First, Castaner and Campos (2002) revolve around the type of artistic innovation that involves the content and meaning of art being interpreted through various artistic material means and contextual implementations related to particularities of people's mindsets and generations. Secondly, there is an organisational innovation mentioned by Bakhshi and Throsby (2010) while dwelling upon the structure of the institution and the way of communicating with the customer. This innovation should be partially related to other types of innovation as well as encompass both tangible and intangible aspects. Their research was based on a case study that involved the innovation effect on visitors' experiences and other brand perception metrics. Additionally, Vicente et al. (2012) considers the increasing influence of technologies as a innovation that helps measure and enhance the visitor experience. Indeed, many applications are used at exhibitions to help people understand the underlying concept and idea of the artwork. Moreover, innovation implementation differs across different continents (Vicente et al., 2012). Therefore, there is a need to investigate user experience on the same level as customer or visitor experience, as it has become one of the touchpoints on the customer journey (Kotler et al. 2016).

However, perception may be regarded as an emotional response to an external trigger, in this case art pieces and exhibitions in general as well as accompanying elements integrated into the customer journey. However, emotional responses are seen as being of a complex nature that is difficult to evaluate or assess with high precision. Moreover, researchers approach them from different fields of study, being inclined to speculate in a multidisciplinary manner. To begin with, aesthetics as a branch of philosophy approaches emotions and thoughts through philosophical metaphors, revealing sensations and inner responses to the development of thoughts and consequential reactions (Mamardashvily, 2001). Moreover, psychology draws conclusions about preceding events influencing the formation of an individual and reflecting presumptions on which they tend to rely on Vainikka (2015). Another perspective that has gained wide recognition in scientific studies concerns customer and visitor behavior from a sociological point of view. For instance, Peterson (1992) attempted to identify cultural consumption behaviors based on the level of education and status-related self-actualisation: univores and omnivores. The final point is yet to be made on the basis of the generalization of all the propositions ever advanced in research. However, Howe and Strauss's (2000) ideas of generations (for example, Gen X, Y, Z) make this perception analysis ever-topical within the changing context and experience of people.

Relying on previous research, it is evident that emotions, and therefore visitor experience, are related to the background of a person and his or her readiness to embrace information at the given period of time. Thus, we assume that the emotions that a person is able to experience at an exhibition are highly related to their educational background. Considering the arts and culture sphere, if a person is intellectually prepared to absorb the information provided, he or she will be able to gain a greater emotional experience as a consequence of the visitor experience. As a result, the research questions that will guide the current work are how a person's educational background affects the communication of art information and what is the basis of an emotional response to art.

It is hypothesized that emotional intellect may relate to emotions and, as a result, be interesting for art-major students [H1]. The logic behind is that quantitative data about emotions that is available in applications is more relevant and desirable for them than numbers and figures that indicate only quantities of observation, for instance. Emotions and extended reactions (like comments and emotional reactions) are more valuable to them.

Furthermore, it is regarded as a basis for the hypothesis that artwork comments correlate with emotional responses and interest in art work among exhibition visitors [H2]. The idea is that comments will provide rather more extended information than likes or the number of observations in an application. Therefore, if a person

needs to comment on an application, there will also be a need for emotions and interesting insights. It may be dictated by the need for communication and emotional exchange with other people.

To test the hypotheses indicated above, it has been considered appropriate to choose secondary data from the customer experience investigation. The article, which is based on the data, was provided by Yi T et al. (2022), who investigated diverse features of an application to enhance the user and visitor experience. They particularly compare thoughts of their respondents making a multi-staged communication with their customers. The current work will predominantly be based on the first stage—the online survey, whose features will be presented in detail in the methodological part. The main limitation of the work is related to the participants: university students, office workers, and museum workers recruited from multiple online communities in South Korea. In other words, there are people with diverse profiles but the same nation-related specifics. Moreover, the research is temporarily bound, meaning that the data was collected recently but might slightly change within a certain period of time. However, while the research is highly reliable given the source of its publication, there is a need to test the data and its quality. The methodology proposed for this purpose will be indicated in the following section.

The structure of the analysis provided will start with the methodological section, then the results will be highlighted and discussed. The final part will be the Conclusion with indicated perspectives for this purpose will be indicated in the following section.

## 2. Methods

The data that was collected in the analyzed article will be used to test our hypotheses and answer research questions. The following research tools for R analysis were chosen: Chi-Square test, Welch Test, K-Means clustering, ANOVA. It is important to highlight, that the presented in research data consisted only of assessed factors, ratings and reviews of visitors, education (art major/other spheres), classification of visitors on clusters. The information about age, sex and open answers of visitors are not presented in Exel database. Moreover, only database from survey is used in presented research.

The methodology of analyzed article includes quantitative research methods: 1) online survey among museum visitors; 2) visitor experiment. Researchers designed three stages: (1) insight research to collect visitors' VSCI needs and opinions; (2) museum application design and prototyping based on the derived insights; and (3) visitor experiments to reveal the impact of VSCI on the visitor experience.

### 2.1. Survey

In survey 71 people (42- female, 29-male) took part. The average year was 31 years. The participants included university students, office workers, and museum workers recruited from multiple online communities in South Korea (e.g., ARA and Hongikin).

The main aim of survey is to identify the visitors' needs and interest for visual-based social contextual information (VSCI), get an information as a basis for designing mobile app. The VSCI is formed by several factors: visitor evaluation (visitor satisfaction of exhibition, art experience of artwork), visitor behavior (timing and tracking museum), emotional response, art features noticed by visitors (visual features of artworks), visitors' comments (exhibition comments, comments on artwork).

The survey consisted of four parts. The first part reflected the demographic information of participants. The second stage is aimed to identify the main features that rose the curiosity of participants when viewing artworks and exhibitions. The 7-point Likert scale (1: very negative to 7: very positive) was used to evaluate 17 elements that were presented. Moreover, it was proposed to justify the reason for the assessment, as well as the features of the painting / exhibition that aroused interest. The third and fourth sections are contained the questions about art to understand the distinction between art majors and non-majors makes a difference in their levels of interest or knowledge.

### 2.2. Visitor experiment

In order to define the influence of providing VSCI to visitors' behavior and reactions the experiment was conducted. The researchers used a mobile eye-tracker (MET; Pupil Labs, Pupil Core 120 Hz binocular) to

collect the behavioral data of visitors. MET provides profound data through a scene camera that allows users to obtain information about the environment. For experiment 40 (male - 19, female - 21) participants, who have normal vision, were hired. Among them 16 people were connected to art field and 24 people worked in other fields.

They used two types of exhibitions in a laboratory and used high-quality images of artwork to indicate the absence of a significant difference in the appreciation of original artworks. For distinguishing the effect of VSCI in a visitor experiment, scholars divided the art series into two exhibitions. Furthermore, all participants were requested to use the same mobile phone. The experiment was conducted during 15 days and contains 3 blocks.

### 3. Results

First, we conducted descriptive statistics. Since our data was collected on the 7-point Likert scale, they belong to the ordinal type. Because of this, the median is the most informative for us, it is also the most resistant to outliers, which means it gives more reliable results. According to the median, we saw the most desired features in the application (VSCI elements) for respondents are: Artwork. Comments and Most.popular.artworks (Median = 6). The least are Avg.Revisit.counts and Revisit.counts.to.artwork (Median = 3). This gave us some insights on which features are worth paying attention to when analyzing.

Second, we decided to check the strength of the associations between art-major and the VSCI elements using non-parametric Spearman correlation. The art major variable does not correlate significantly with any features from the application, so we removed it from the matrix, as well as other features that did not carry important information (Fig. 1, p. sig.level=0.01). As a result, we can say that the remaining features are positively correlated with each other and give out logical strong connections. For example:

- Spearman correlation coefficient for “Liking to artwork” and “Viewing time to artwork” is 0.70.
- Spearman correlation coefficient for “Liking to artwork” and “Interest to artwork” is 0.68.
- Spearman correlation coefficient for “Viewing time to artwork” and “Revisit counts to artwork” is 0.79 and so on.

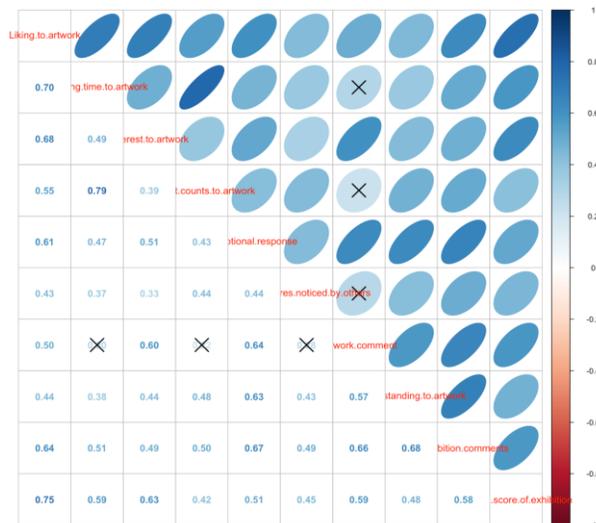


Fig 1. Spearman correlation plot (Liking to artwork, Viewing time to artwork, Interest to artwork, Revisit counts to artwork, Emotional response, Art features noticed by others, Artwork comment, Understanding to artwork, Exhibition comments, Overall score of exhibition)

All this confirms the correctness of the questionnaire created by the researchers and the sequence of respondents' responses. But since we could not find confirmation of our hypotheses in this way, we decided to

conduct a **Chi-Square test** to determine if nominal and categorical variables such as art-major and VSCI elements have a significant correlation or not.

We found that art-major has a significant correlation with such variables (VSCI elements) like Emotional.response and Artwork.comment (Emotional.response: X-squared = 13.281, p-value = 0.03878 < 0.05; Artwork.comment: X-squared = 12.505, p-value = 0.02849 < 0.05). Which confirms our hypothesis H1 and H2. We also conducted the **Welch Test (two independent samples, unequal deviations)** to check whether there was a difference between art- majors and not-art majors with regard to art knowledge (Art.knowledge.score and Art.interest.score - quantitative data). There were statistically significant differences between the two groups in both categories (Art.knowledge.score: t = -9.1816, p-value = 1.801e-11 < 0.01; Art.interest.score t = -4.3846, p-value = 2.379e-05 < 0.01). This means that the presence of experience in art is precisely connected with the presence of great knowledge and great interest in art and significantly distinguishes these groups.

Next, we decided to repeat the segmentation of respondents using **K-Means clustering**. First, we did segmentation the same way as in the article, using only the features of the application and got the same result (Fig 2, Cluster 1 = 45 respondents, cluster 2 = 26). But we were interested in what would happen if we added such characteristics of respondents as art.major, art interest and art knowledge to clustering. We got two different clusters (Cluster 1 = 52, cluster 2 = 19).

We can name a larger cluster 1 (52) of “people who are not indifferent to art”, there are only 21% of art-majors in this cluster, knowledge about art in this cluster is low (Median = 30, max score = 100), interest can be considered moderate (Median = 36.5, maximum score 77 points). The second smaller cluster 2 (19), on the contrary, consists entirely of art-majors. Therefore, it is quite logical that their knowledge and interest is much higher than that of the first cluster (Art.knowledge.score: Median = 70, max score = 100; Art.interest.score: Median = 58, max score 77 points). That's why we called them “art lovers”.

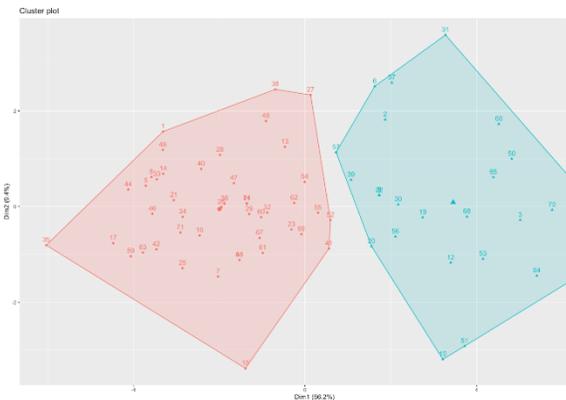


Fig 2. Cluster plot, replication analysis.

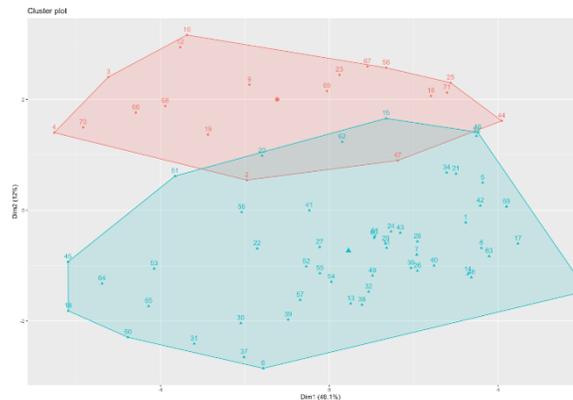


Fig 3. Cluster plot, our original analysis.

Then we decided to build a **Radar chart by k-means** in order to visualize the differences in the estimates of the VSCI elements between groups of “not indifferent” and “art lovers”. The most popular features among those who are “not indifferent” were: Emotional response (Mean = 5.2), Artistic features noticed by others (Mean = 5.1), Artwork **comment** (Mean = **5.5**), Comments on exhibitions (Mean = 5.3), **Most popular artworks** (Mean = **5.8**).

And among “art lovers”, the following features were highlighted: Emotional response (Mean = 4.4), Art features noticed by others (Mean = 4.5), **Artwork comment** (Mean = 4.6), Overall score of exhibitions (Mean = 4.4), Most popular artworks (Mean = 4.4), **Visitor type** (Mean = 4.6).

Next, an **ANOVA was performed** to check the differences between the two clusters for all VSCI elements and art experience. Naturally, we saw that the division into clusters occurred due to the influence of such features as: Art.major, Art.knowledge.score, Art.interest.score (p-value < 0.01). However, it is also clear that the differences in the choice of the following elements have become significant: Viewing time to artwork (p-value < 0.01), and Understanding to artwork, Overall score of exhibition, Most popular artworks (p-value < 0.05) and Avg. Proportion of visitors who viewed (p-value < 0.001).

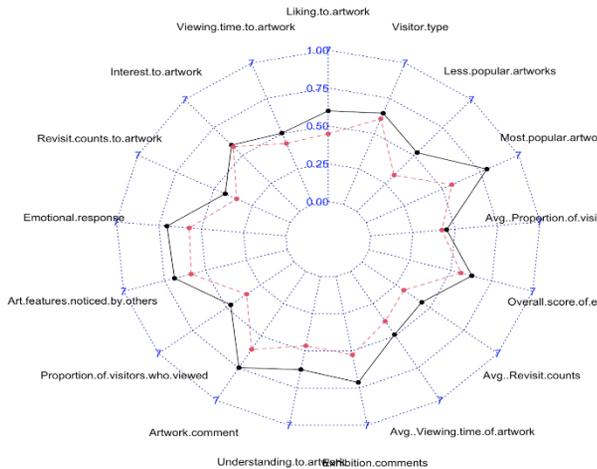


Fig 4. Radar chart k-means clustering.

	Df	Sum Sq	Mean Sq	F value	F
Art-major	1	6.949	6.949	142.356	3.0
Liking.to.artwork	1	0.401	0.401	8.215	0.
Viewing.time.to.artwork	1	0.027	0.027	0.553	0.
Interest.to.artwork	1	0.090	0.090	1.837	0.
Revisit.counts.to.artwork	1	0.132	0.132	2.695	0.
Emotional.response	1	0.048	0.048	0.979	0.
Art.features.noticed.by.others	1	0.001	0.001	0.020	0.
Proportion.of.visitors.who.viewed	1	0.008	0.008	0.156	0.
Artwork.comment	1	0.091	0.091	1.855	0.
Understanding.to.artwork	1	0.232	0.232	4.746	0.
Exhibition.comments	1	0.027	0.027	0.546	0.
Avg..Viewing.time.of.artwork	1	0.102	0.102	2.091	0.
Avg..Revisit.counts	1	0.003	0.003	0.060	0.
Overall.score.of.exhibition	1	0.233	0.233	4.770	0.
Avg..Proportion.of.visitors.who.viewed	1	1.016	1.016	20.824	3.2
Most.popular.artworks	1	0.289	0.289	5.925	0.
Less.popular.artworks	1	0.002	0.002	0.039	0.
Visitor.type	1	0.000	0.000	0.001	0.
Art.knowledge.score	1	1.415	1.415	28.985	1.9
Art.interest.score	1	0.411	0.411	8.423	0.
Residuals	50	2.441	0.049		

---  
Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Fig 5. ANOVA, cluster analysis.

Thus, we see that emotional responses and comments (to an exhibition or to a work of art) come across among the popular features for both groups. But at the same time, Anova's analysis shows that the cluster of respondents who are not indifferent to art distinguishes more quantitative, simpler reactions (likes, viewing time, overall score etc.) from art lovers, which indirectly confirms once again our hypothesis that art-major makes respondents more interested in a more complex response from other people and their ambiguous emotional reaction.

#### 4. Discussion

The results of the research represent that the VSCI elements selected by the researchers, due to their positive correlation, are really able to make a solid contribution to the visitors' experience. We were once again convinced that the presence of a background in art distinguishes people by their knowledge and interest. Despite the fact that in general everyone reacted positively to almost all the proposed VSCI elements for the application, still people who love art more professionally want to see a less direct assessment of exhibitions and art itself, in contrast to amateurs. This may also be due to the fact that comments and emotional evaluation carry more information. At the same time, it cannot be denied that comments are a fairly standard element for any application and it is quite possible that this element distinguished at almost every stage of the analysis only because it is comprehensible and familiar to respondents. However, it also brings us back to the hypothesis of the researchers, because comments are the closest to social interaction between people (only safer and more indirect). Perhaps the reason why this element stands out from all the rest is a proximity to a real exchange of opinions.

## 5. Conclusion

The study investigates the impact of visitor-based social contextual information on museum visitors' experiences as well as the perceptual linkages involved in visitor and customer experiences at the exhibition. We employed descriptive statistics, Spearman correlation, and the Chi-square test. We discovered that the correlation between variables is high, indicating that the data is of high quality. We discovered that art majors had higher emotional intelligence and were more interested in qualitative facts since they formed the basis of communicative and emotional exchange. Following that, we utilized clustering k-means to display the differences in VSCI element estimations between the "not indifferent" and "art lovers" groups. Finally, we utilized ANOVA to reveal the differences between the two groups for all VSCI components and the art experience ANOVA was done to assess the differences between the two clusters for all VSCI elements and art experience. This information was gathered through surveying among Koreans using a Likert scale. Following these findings, it is possible to conduct qualitative research to understand the underlying motivation of art-major students related to application usage.

## References

- Bakhshi, H. and Throsby, D. (2010) *Culture of Innovation. An Economic Analysis of Innovation in Arts and Cultural Organisations*. Londres: NESTA.
- Castaner, X. and Campos, L. (2002) *The Determinants of Artistic Innovation: Bringing in the Role Organizations*. *Journal of Cultural Economics*, 26 pp29–52.
- Howe, N., & Strauss, W. (2000). *Millennials rising: The next great generation*. New York: Vintage Books.
- Kotler, P. & Peppers, D., Rogers, M. (2016). *Managing Customer Experience and Relationships: A Strategic Framework*, 3rd Edition. John Wiley & Sons.
- Mamardashvily, M. (2001) *Aesthetics of thought*. Moscow: Moscow School of Political Research.
- Peterson, R. A. 1992. "Understanding Audience Segmentation: From Elite and Mass to Omnivore and Univore." *Poetics* 21:243–58.
- Vainikka, B. (2015) *Psychological factors influencing consumer behaviour*. Centria. Retrieved from: [https://www.theseus.fi/bitstream/handle/10024/96405/Vainikka\\_Bianca.pdf.pdf](https://www.theseus.fi/bitstream/handle/10024/96405/Vainikka_Bianca.pdf.pdf).
- Vicente, E., Camarero, C., & Garrido, M. J., (2012) *Insights into Innovation in European Museums*, *Public Management Review*, 14:5, 649-679, DOI: 10.1080/14719037.2011.642566.
- Yi T, Lee H-y, Yum J, Lee J-H (2022) *The influence of visitor-based social contextual information on visitors' museum experience*. *PLoS ONE* 17(5): e0266856. <https://doi.org/10.1371/journal.pone.0266856>.