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Original Research Article

The New Acropolis Museum: Short Statistical Analysis for a Sustainable Operation with Active Visitors Based on a Sample of Students of the University of Athens

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Abstract

The purpose of this study is to examine the new Acropolis Museum and its potential visits, with a focus on the number of students at the University of Athens visiting it. The dimensions studied are the new museum's functionality, accessibility, and the intention to and motives for visiting it. The new museum has been open for 14 years and is viewed as a symbol of an exceptional cultural experience by both Greek and foreign visitors. As the focus of our field study, the students replied to mainly quantitative questions via computer, and we then performed a statistical analysis of their replies.

Keywords: Acropolis Museum, Athens, Field Study, Museum, Sustainable Operation, Students

INTRODUCTION

A museum is a means to safeguard and showcase our cultural heritage; it is a place where visitors can study the past and present, enrich their knowledge, contemplate, and also be entertained. The term "museum" comes from the Muses, the ancient Greek goddesses embodying the arts, sciences, and literature. According to the International Council of Museums (ICOM), museums are permanent, non-profit institutions at the service of society and its cultural development; they are open to the public and preserve, study, share, and exhibit the material testimonies of humankind and its environments (Mpletsos, 2019). The noted Greek magazine "Parallaxi" (28/08/2022) posited that the definition of the museum also includes concepts such as those of participation, accessibility, sustainability, and ethics, with museums being open to the public and not exclusive, promoting diversity and sustainability (ICOM, Greek branch, 24/08/2022). According to the Greek Ministry of Culture, the new Acropolis Museum is one of the greatest museums in the world, comprising unique masterpieces – mainly original works of Greek art from the Archaic and Classical times – directly linked to the sacred rock of the Acropolis – independent votive sculptures, as well as set of decorative sculptures added on the edifices of the Acropolis at various points in time. The museum's displays also include votive and decree reliefs, ceramic vessels, figurines, reliefs, etc., bronze items, and other small craft work items.

METHODOLOGY

We began the study with open-ended questions to the students of the University of Athens – the qualitative part

of the study – and then asked them close-ended questions using the "Google Forms" tool; we processed those answers with the IBM SPSS Statistics 29 program.

Analysis of the variables

The climate of Athens

According to the records, the climate of Athens is characterized by long dry summers and mild and wet winters (average winter temperature: 8.9°C), making it a warm, semi-arid climate. Snowfall is more common in the northern areas of the city, and the average annual rainfall amounts to 433.1mm, the raining season being mainly between October and April. July and August are the driest months, with the occasional summer storm (once or twice a month), and temperatures often exceeding 38-40°C during the city's common heatwaves (Aristeidou, 2022). Figure 1

A brief presentation of Athens' spatial planning

The Parthenon and the Acropolis, as well as other landmarks, archaeological sites, and monuments are found in and around the center of the city, and are easily accessible by the public (Kourkakis, 2016). The Municipality of Athens is the seat of the Central Sector of the general Athens area; it covers an area of 38.96 km^2 and has a population of 664,046, as per the 2021 census. The Municipality of Athens is divided into seven districts, named after their respective number from 1 to 7, with all districts populated by approximately the same number of people. District 1 includes the city center, District 2 the southeastern neighborhoods, District 3 the southwestern neighborhoods, District 4 the western neighborhoods, District 5 the northwestern neighborhoods, District 6 the central northern neighborhoods, and District 7 the northeastern neighborhoods. Figure 2

Athens

Athens has been the capital of Greece since 1834, and it is the country's largest and most densely populated city, covering an area of 38,96 km^2 and with a population of 664,046 (as aforementioned). Named after the goddess Athena, it constitutes one of the most ancient cities in the world, with its recorded history dating back to 3200 BC. As any capital city, it has a specific character as the seat of powers and as to its administrative structures and its classes, all of which has influenced its spatial planning as the background to cultural, economic, and other developments (Drakaki-Sapounaki, 2005). Athens' communication indexes include the social and cultural associations related to communication potentials, diverse social entities, and those visiting the city (Karydas, 2007).

The New Acropolis Museum

Law 3711/2008 (Government Gazette 224/A/5-11-2008) stipulates the establishment of a public law entity by the name "Acropolis Museum". This museum is located at 300 meters southeast of the sacred rock of Acropolis, and at approximately 2 kilometers from the city center. Focusing on the archaeological finds in the Acropolis area, it constitutes one of the most important works of contemporary architecture in Athens – its foundation was laid in 2003 and the construction was completed in 2007 (Giakoumidi, 2017).

Identity of the Study – This paper concerns a Quantitative Study

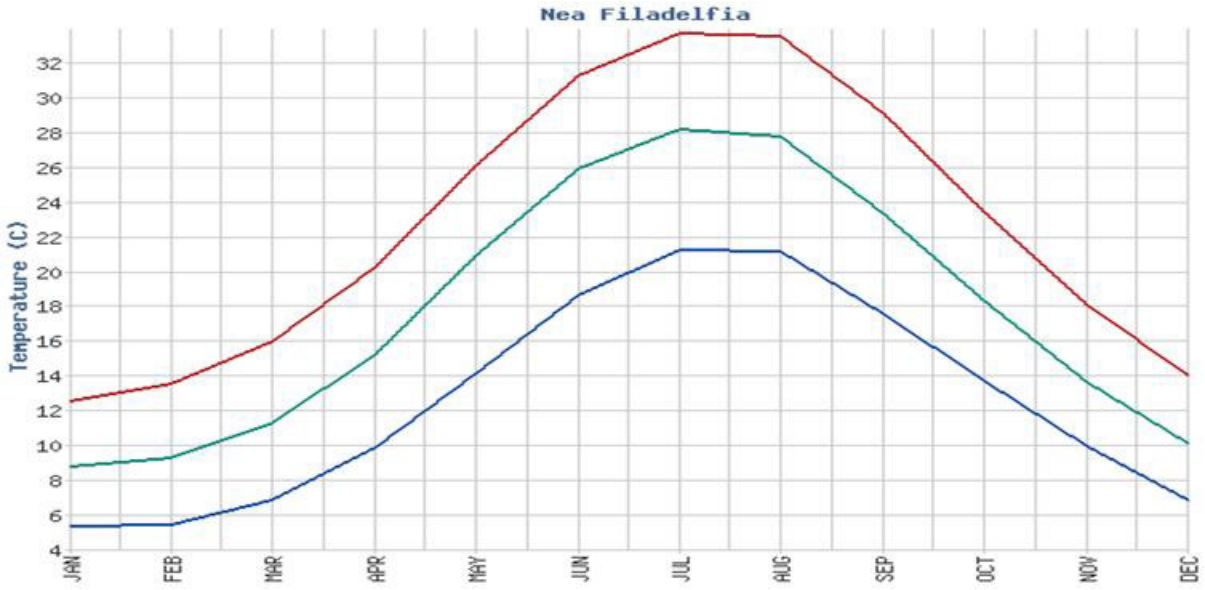
The sample comprised 103 University students (61 female, 42 male) from the Department of Humanities of the University of Athens. Therefore, the sample came from the wider Athens area. The time frame of the study was from June to September 2023. The questionnaires included 11 questions, ensured the students' anonymity, and were filled in by the students themselves via a "Google Forms" program. The answers were processed with the IBM SPSS Statistics 29 program. Participation to the study was voluntary, and the participants were informed about our adherence to the Code of Ethics, and that any findings would be published solely for scientific/research purposes.

Statistical Analysis

The Frequency Histogram regarding the participants' gender shows that 42 men (40.8%) and 61 women (59.2%) participated in the study, percentages that indicate that women know more about museums and visit them more frequently. Table 1, 2 and Figure 3

The Frequency Histogram regarding the participants' age shows that 68 of them are between the ages of 18-25 (66%), 30 are between the ages of 26-40 (29.1)%, and just 5 (4.9%) are over the age of 40. A significant piece of information showcased here is that the greater percentage of people visiting museums is between 18 and 25 years old, which not only gives a positive impression but also an optimistic outlook, as it indicates that young people are interested in and seek information on their history and culture. Table 3, Figure 4

The Relative Frequency Pie Chart regarding the participants' level of education shows that 44 of them (42.7%) are University students, 28 (27.2%) are University graduates, 27 (26.2%) hold a Master's title,



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Minimum Monthly Temperature °C (Blue line)	5.4	5.5	6.9	9.9	14.2	18.7	21.3	21.2	17.6	13.8	10.0	6.9
Average Monthly Temperature °C (Green line)	8.8	9.3	11.3	15.3	21.0	26.0	28.3	27.8	23.4	18.4	13.7	10.2
Maximum Monthly Temperature °C (Red line)	12.6	13.6	16.0	20.3	26.2	31.4	33.8	33.6	29.2	23.5	18.1	14.1

Figure 1. Climate Data: 1955-2019

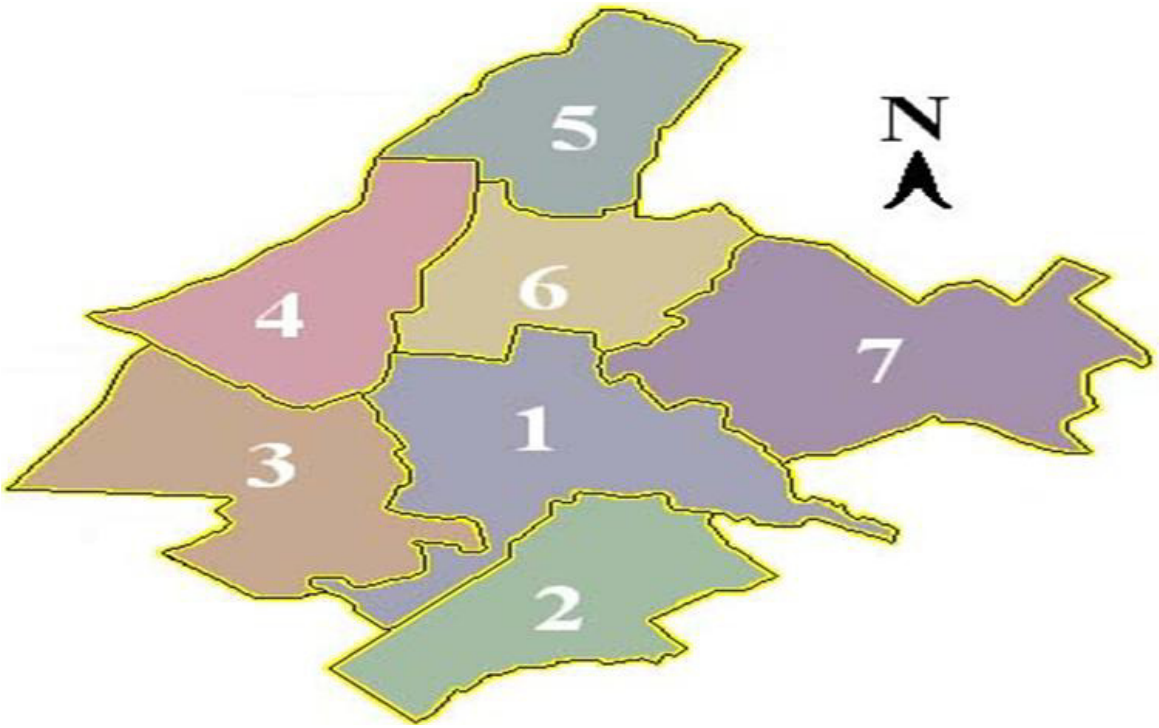


Figure 2. The Municipality of Athens

Table 1. Statistics

		1. Gender	2. Age
N	Valid	103	103
	Missing	0	0

Table 2. Gender

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Male	42	40.8	40.8	40.8
	Female	61	59.2	59.2	100.0
	Total	103	100.0	100.0	

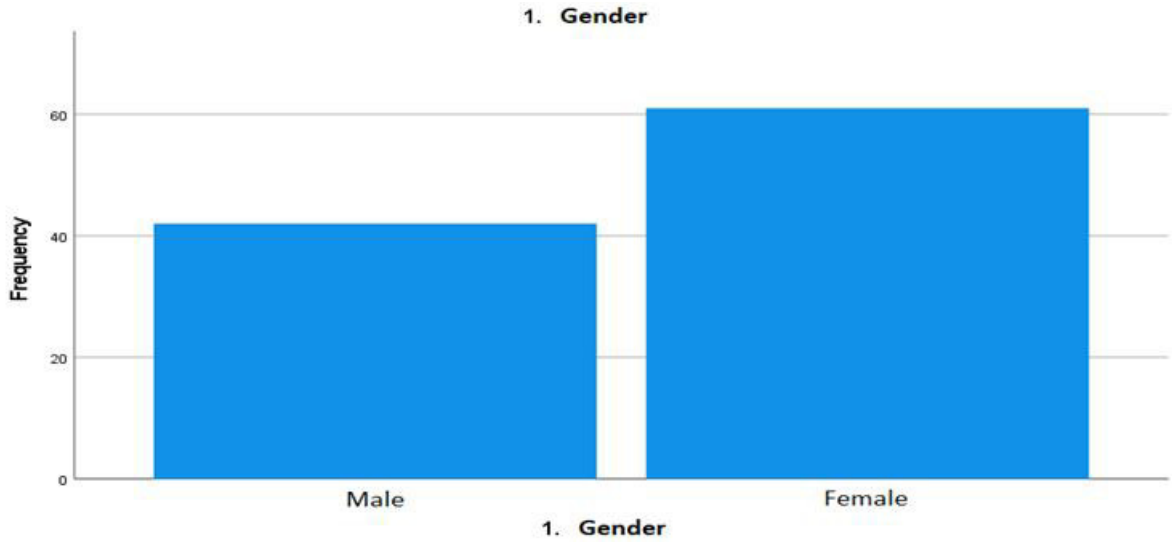


Figure 3. Gender

Table 3. Age

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	18-25	68	66.0	66.0	66.0
	26-40	30	29.1	29.1	95.1
	>40	5	4.9	4.9	100.0
	Total	103	100.0	100.0	

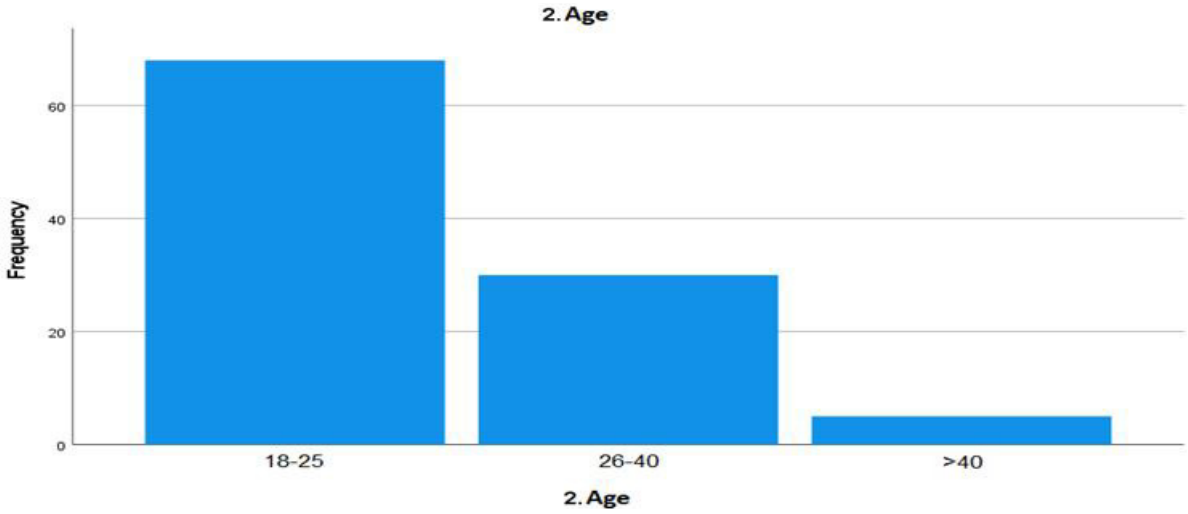


Figure 4. Age

Table 4. Education level

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Doctorate (PhD)	4	3.9	3.9	3.9
	Master's	27	26.2	26.2	30.1
	University Graduate	28	27.2	27.2	57.3
	University Student	44	42.7	42.7	100.0
	Total	103	100.0	100.0	

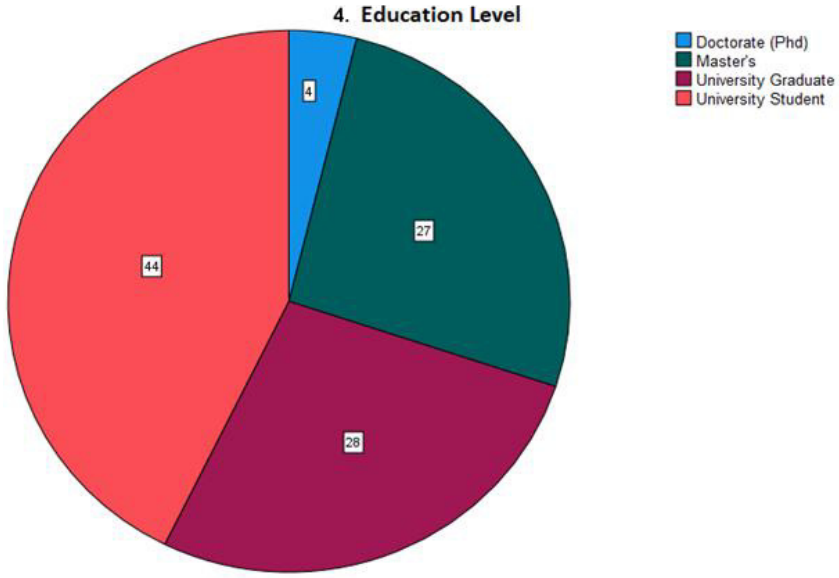


Figure 5. Education level

and 4 (3.9%) have a PhD, which can be associated with the previous data regarding young people's interest in visiting museums. Table 4, Figure 5

This Pie Chart shows that the participants draw information on the new Acropolis Museum from the Internet (54 – 52.4%), various acquaintances (18 – 17.5%), from newspapers (11 – 10.7%), magazines (10 – 9.7%), and TV (10 – 9.7%). Table 5, Figure 6

Table 5. Where can one get information on the operation of the Acropolis Museum of Athens, in your opinion?

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Internet	54	52.4	52.4	52.4
	Newspapers	11	10.7	10.7	63.1
	Magazines	10	9.7	9.7	72.8
	Friends/Relatives/Colleagues	18	17.5	17.5	90.3
	TV	10	9.7	9.7	100.0
	Total	103	100.0	100.0	

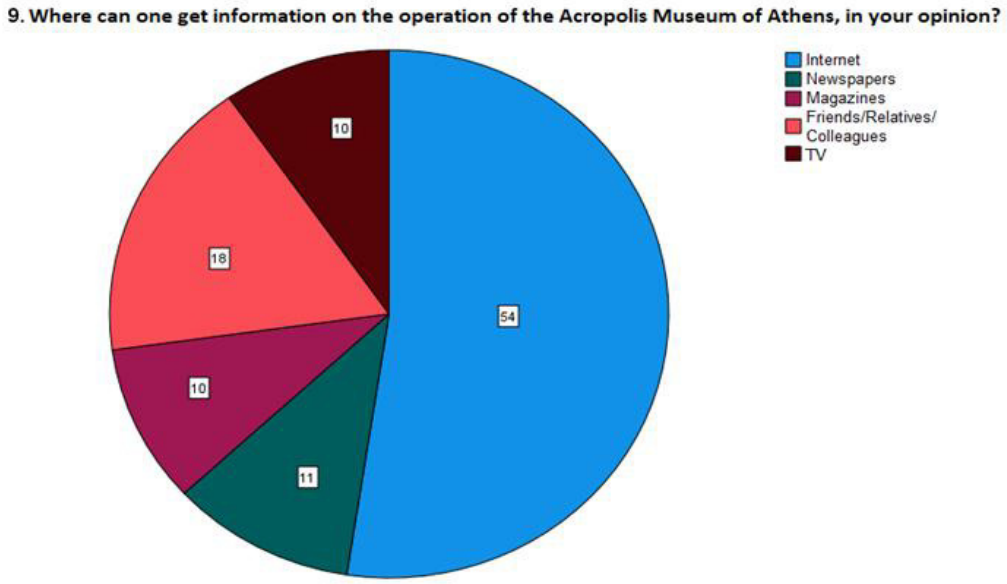


Figure 6. Where can one get information on the operation of the Acropolis Museum of Athens, in your opinion?

Table 6. Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percentage	N	Percentage	N	Percentage
Do you view museums as something exclusive and inaccessible?	103	100.0%	0	0.0%	103	100.0%

Descriptives

			Statistic	Std. Error
Do you view museums as something exclusive and inaccessible?	Mean		3.84	.122
	95% Confidence Interval for Mean	Lower Bound	3.60	
		Upper Bound	4.09	
	5% Trimmed Mean		3.94	
	Median		4.00	
	Variance		1.544	
	Std. Deviation		1.243	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		2	
	Skewness		-1.043	.238
	Kurtosis		.262	.472

Table 7. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Do you view museums as something exclusive and inaccessible?	.239	103	.000	.809	103	.000

a. Lilliefors Significance Correction

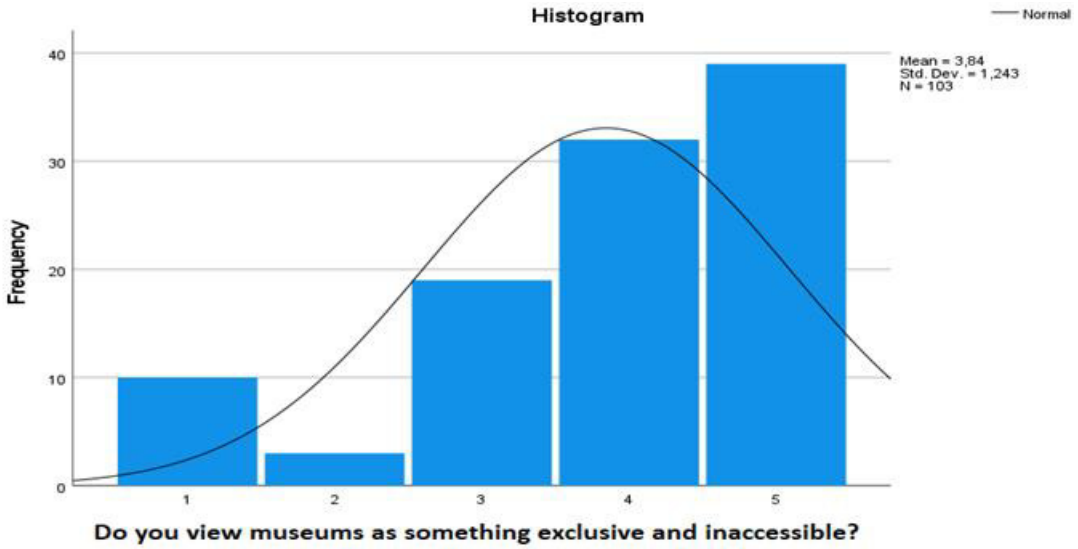


Figure 7. Histogram

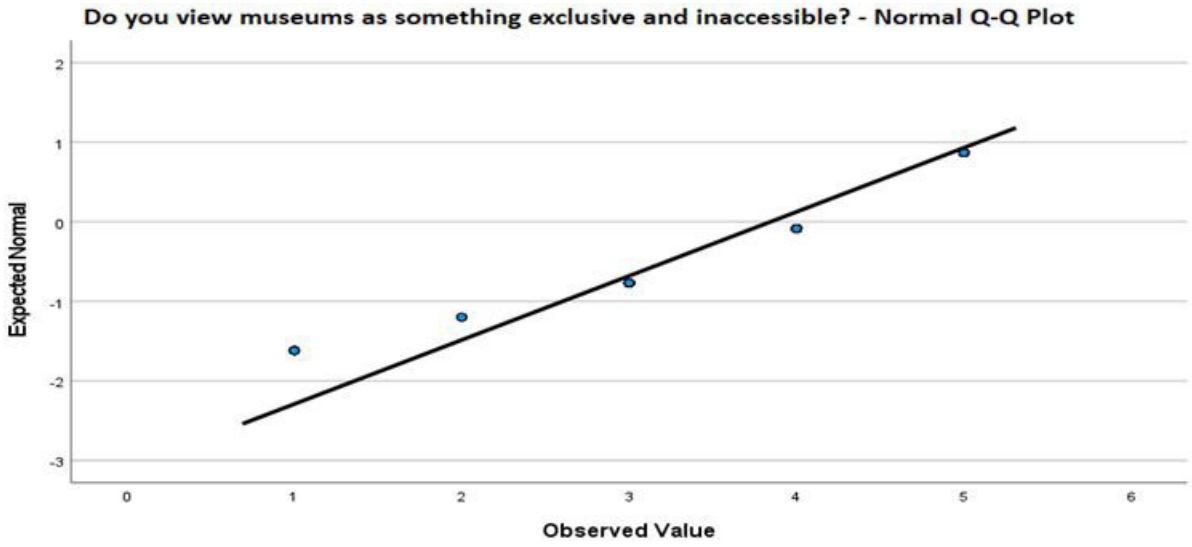


Figure 8. Do you view museums as something exclusive and in accessible?-Normal Q-Q Plot

Test of Normality

The Test of Normality is arguably the greatest statistical hypothesis testing. Its purpose is the calculation of the probability of a random variable being adequately represented by the Normal Distribution. As to a set of data, this test can determine whether the data set is adequately modeled by the Normal Distribution, in which case the researchers may proceed with the One-Way and Two-Way ANOVA tables, as well as the conditions,

Table 8. Tests for Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Do you view museums as something exclusive and inaccessible?	Based on Mean	.873	2	100	.421
	Based on Median	.537	2	100	.586
	Based on Median and with adjusted df	.537	2	98.032	.586
	Based on trimmed mean	.823	2	100	.442

Table 9. Anova

Do you view museums as something exclusive and inaccessible?					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	1.227	2	.614	.393	.676
Within Groups	156.287	100	1.563		
Total	157.515	102			

Table 10. Post Hoc Tests

Multiple Comparisons						
Dependent Variable: Do you view museums as something exclusive and inaccessible?						
Tukey HSD						
(I) 2. Age	(J) 2. Age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
18-25	26-40	-.095	.274	.936	-.75	.56
	>40	.438	.579	.730	-.94	1.82
26-40	18-25	.095	.274	.936	-.56	.75
	>40	.533	.604	.652	-.90	1.97
>40	18-25	-.438	.579	.730	-1.82	.94
	26-40	-.533	.604	.652	-1.97	.90

Table 11. Homogeneous Subsets

Question: Do you view museums as something exclusive and inaccessible?		
Tukey HSD[a,b]		
2. Age	N	Subset for alpha = 0.05
		1
>40	5	3.40
18-25	68	3.84
26-40	30	3.93
Sig.		.548
Means for groups in homogeneous subsets are displayed.		
a. Uses Harmonic Mean Sample Size = 12.095.		
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.		

where the dependent variable should appear near the normal position.

Null Hypothesis

H0: The tested distribution does not differ from the normal distribution.

Alternative Hypothesis

H1: The tested distribution differs from the normal distribution.

The Normal Distribution shall be tested using all three of the following methods:

Table 12. Between-Subjects Factors

		Value Label	N
Gender	1	Male	42
	2	Female	61
Family Status	1	Unmarried	67
	2	Married	15
	3	Married with children	17
	4	Married without children	4

Table 13. Tests of Between-Subjects Effects

Dependent Variable: Do you view museums as something exclusive and inaccessible?					
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	9.739[a]	6	1.623	1.054	.395
Intercept	666.935	1	666.935	433.264	.000
Gender	.006	1	.006	.004	.950
Family Status	2.183	3	.728	.473	.702
Gender * Family Status	5.911	2	2.955	1.920	.152
Error	147.775	96	1.539		
Total	1680.000	103			
Corrected Total	157.515	102			
a. R Squared = .062 (Adjusted R Squared = .003)					

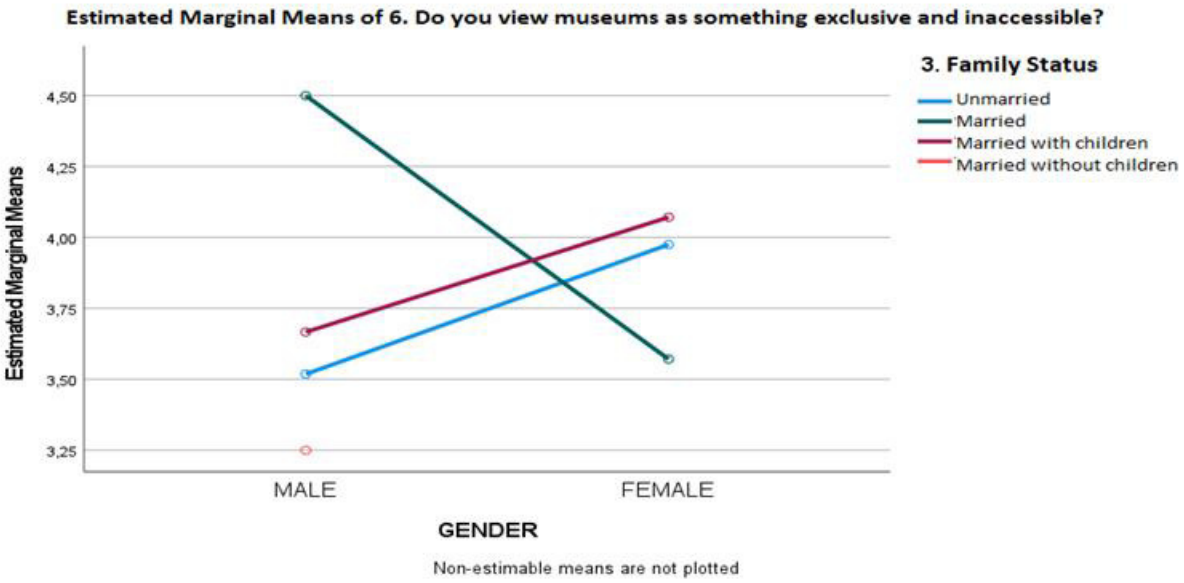


Figure 9. Profile Plots

1. Skewness and Kurtosis
2. The Kolmogorov-Smirnov and Shapiro Wilk tests
3. Various graphs (histograms, normal curve, regular q-q graphs

It is noted that skewness and kurtosis are between (-2,+2), therefore near the normal distribution, yet we also need to examine the following data in order to ascertain that. Table 6

It is here noted that the Kolmogorov-Smirnov & Shapiro-Wilk Sig is <0.05, therefore statistically different from the normal distribution. However, both test (as well as others) are extremely sensitive to large samples and tend to dismiss normality, even in cases of the slightest deviation from it, which is why in cases of large samples (such as this case), the histogram is tested in relation to the normal curve, which is presented in the SPSS, and the

qq-plot is also tested for even greater accuracy. Table 7

It is evident here that the curve follows the normal distribution, as it is evident in the Normal Q-Q Plot graph that the points are on or very near the line, which allows us to conclude that the Normal Distribution is followed.

One-Way ANOVA

Null Hypothesis

H0: There is no significant difference between the age groups as to their opinions on the accessibility of museums.

Alternative Hypothesis

H1: People's opinions on the accessibility of museums differ depending on their age group.

The "Test for Homogeneity of Variance" table contains the results from Levene's test, where it is noted that Sig. exceeds 0.05, making it impossible for us to dismiss the null hypothesis on variance equality. Therefore, we deem the variances equal.

The statistical significance of Sig. is of particular interest in the table displaying the results of the One-Way ANOVA, which show no statistically significant difference between the participants' age and their view on the accessibility of museums, since $p=0.676 >0.05$. We thus accept the null hypothesis that there is no significant difference between the age groups as to their opinions on the accessibility of museums with a significance level of $\alpha=5\%$.

The Post Hoc Tests below also show no statically significant difference between the age groups and their views on the accessibility of museums, as every Sig. is over 0.05. Due to the above, we have attributed any difference in the scores to sampling errors. Table 9, 10

Univariate Analysis of Variance (Two-Way ANOVA)

Null Hypotheses

H0.1: There is no significant difference between genders as to their opinions on the accessibility of museums.

H0.2: There is no significant difference between people of different family statuses as to their opinions on the accessibility of museums.

H0.1: There is no significant difference between the varying interactions between people's gender and family status as to their opinions on the accessibility of museums.

Alternative Hypotheses

H1.1: People's opinions on the accessibility of museums differ depending on their gender.

H1.2: People's opinions on the accessibility of museums differ depending on their family status.

H1.3: People's opinions on the accessibility of museums differ depending on the interaction between their gender and family status.

The Two-Way ANOVA conducted showed no statistically significant influence of people's gender and family status on their views regarding the accessibility of museums [$F(6.96) = 1.054$, $p=.395$, where 6 is the Corrected model df and 96 the Error df]. In detail, there was no significant difference as to people's opinion on the accessibility of museums regardless of whether they were male or female, ($p=.950$), their family status ($p=.702$), and the interaction between their gender and their family status. We thus dismiss the H1 and accept the H0 at this level of significance. Table 11, 12, Figure 9

Setting the goals of the study

Among the participants (University of Athens students) we first distinguished those most willing to participate in either the quantitative or the qualitative study. The general image formed, based on their answers, was of people with certain experience with museums, therefore with more generalized or specific views on the new Acropolis Museum. It also emerged that younger people are more interested in the new museum, which was corroborated by the education level section – with University students showing more interest.

A deeper analysis of the replies shows that the main source of information on museums is the internet, followed by acquaintances, with newspapers, magazines, and TV combined constituting about a third of the sources; it could thus be surmised that Internet users are potential visitors of the Acropolis Museum.

Some participants were willing to discuss the new Acropolis Museum but unwilling to fill in the questionnaire via Google Forms, so they (over 50 individuals) formed part of our small-scale qualitative study. The first question asked in that study was whether we must treat the new Acropolis Museum with particular respect and awe, given that in some way it hosts the entirety of Greece and its history; although the answers were not codified in our notes, we can attest that the majority were in agreement with this view, yet some objections were also raised. When asked whether people ought to be aware of the essence and contents of the new Acropolis museum before visiting, the participants gave replies that complemented each other, with the vast majority deeming such awareness as a prerequisite. The answers to the question about the social groups at which the new Acropolis Museum is directed were multiple and contradictory, especially regarding the entrance fee, as the majority of the participants believe that entrance should be free for lower – or even middle – economic classes in times of financial crisis; the

prevailing view was that the Acropolis Museum does invite people from any and all economic backgrounds, yet without taking into consideration the economic reality.

CONCLUSIONS FROM THE RESEARCH FINDINGS

Identity of the study

The questionnaires were processed by analyzing specific questions-answers. The potential answers available were based on the Likert scale: Strongly Disagree – Strongly Agree – Neutral – Agree – Strongly Agree. The size of the sample was 103 students, of which 61 (59.2%) were female and 42 (40.8%) male, which indicated that more women responded to the study, as well as that a greater number of women visit museums. 68 (66%) of the participants were aged 18-25, 30 (29.1%) were aged 26-40, and the remaining 5 (4.9%) were over the age of 40; the fact that the majority of museum visitors were in the 18-25 age group gives a positive impression, as it can be interpreted as young people investing in their history and culture through museums. As to the education level of the sample, 44 (42.7%) of the participants were University students, 28 (27.2%) were University graduates, 27 (26.2%) held a Master's title, and just 4 (3.9%) held a Doctorate title; the most significant finding at this point was that the majority of the participants were University students, indicating a greater interest in and more visits to museums by that generation. On the source of information on the Acropolis Museum hours of operation, 54 (52.4%) participants used the Internet, 18 (17.5%) various acquaintances, and 11 (10.7%) newspapers, with magazines and TV serving as sources for 10 individuals (9.7%) each.

Suggestions

The discussions with the students produced various conclusions and suggestions for the new Acropolis museum. The participants' criticism mainly focused on the architectural design of the exhibition, on the museum's ideological messaging, and on the museum's decision to highlight certain things while suppressing others. In the qualitative part of the study, reservations on museum policies such as targeting people as a market were noted, and most conflicting answers concerned the entrance fee and the (majority) opinion that people who are disadvantaged, unemployed, and/or from lower economic backgrounds should not have to pay it.

Our academic view is that the museum policy makers should apply cultural marketing, on the one hand, but also envision the future of museums, taking into consideration, for instance, reports on the effects of climate change such as the "Regional Impact of Climate Change on European Tourism Demand" and the advent of artificial intelligence in the full spectrum of activities. Upheavals as to the preferred time for certain destinations seem inevitable – for instance, July is currently the month of the greatest number of arrivals and stays in Athens, yet May ends up being the worst month to visit Athens (and the Mediterranean region in general), according to the aforementioned report, with April emerging as the best time to visit. Traditional Mediterranean destinations such as Italy, France, Portugal, Cyprus, and Greece are expected to be hit most severely by the effects of climate change, which is why policy makers need to seek adequate solutions.

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