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Predictors of Adopting a Sustainability Policy in Museums

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Abstract: This paper aims to identify certain factors that may influence museums' success in adopting and implementing a sustainability policy. The research hypotheses were formulated based on an in-depth study of the literature and subsequently tested using classical linear regression methodology. The empirical research is based on 86 Romanian national questionnaires collected in October and November 2016, which tracked museums' self-reported sustainability practices. To examine the relationships between sustainability policy and independent variables, we developed three generalized linear regression models. Our results revealed that environmental behavior and some components of social responsibility (heritage exposure and community involvement) have a positive impact on implementing sustainability policies and principles within museums. Surprisingly, economic performance did not prove to have a significant influence on sustainability policy, suggesting that financial autonomy, efficiency, and productivity are not essential elements in fostering a sustainable mindset within museums. The developed models serve as valuable tools for museum managers, providing guidance in adopting appropriate managerial decisions to achieve sustainability goals. Furthermore, the empirical research offers new insights that enhance and advance current knowledge and research in the field of sustainable management in museums.

Keywords: museum; sustainability; policy; environment; performance; development

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1. Introduction

An important concern of global authorities is to identify possible methods for carrying out economic activities in such a way that they can improve quality of life without harming the environment. Consequently, organizations across all sectors are urged to take measures both to change their own processes in accordance with this philosophy and to influence the attitudes of their consumers. Thus far, there have been many studies regarding sustainability in the private sector, but little research has been conducted on the sustainability of public organizations despite their important role in establishing economic, social, and environmental policies within a country [1–3].

Museums are distinguished from the broad mass of public institutions by the fact that they are the guardians of cultural heritage as well as organizations that can promote economic development through cultural tourism [4]. The environmental and social impact of museums may also be high given their ability to influence the attitudes and values of their visitors [5,6]. Thus, many studies have highlighted that museums are engines of economic development [7] (p. 13), touristic attractions within cultural centers [8], sources of income [9], employment tools [10], and institutions that fight social exclusion [11] through the special programs and activities they develop for socially or physically disadvantaged groups of people [12]. Moreover, through their educational function and the exhibitions, debates, conferences, and events they organize, museums can draw attention to the importance of protecting the environment and ensuring a rational use of natural resources [13].

Therefore, as cultural institutions, museums must support the sustainable development of the regions to which they belong while also prioritizing their own economic sustainability to ensure they have the necessary resources to function and achieve their

socio-cultural and economic goals [14]. For this reason, in recent years, the topic of museum sustainability has been widely debated, prompting several international bodies such as the Canadian Museums Association, the International Council of Museums (ICOM), and the Network of European Museum Organizations (NEMO) to take action in implementing sustainable development principles in museums [15]. To support museums in their sustainability efforts, ICOM and NEMO regularly organize workshops, webinars, training courses, and conferences on sustainability topics. For example, ICOM organized the conference "Public Policies for Sustainable Development in Museums in Europe: Comparisons, Cooperation" in 2023, while NEMO hosted "and... ACTION! Museums in the Climate Crisis" in the same year. Moreover, the new museum definition adopted by ICOM in 2022 incorporates the term 'sustainability' along with other concepts associated with sustainable development, such as inclusiveness, diversity, ethics, and resource conservation [16].

Over the past decade, various indicators and frameworks have been developed to assess museum sustainability, with an example being "the 2019 Common Conceptual Framework for Sustainability of Ibero-American Museum Institutions and Processes" [17]. However, a survey conducted by NEMO in 2022 revealed that while many European museums are implementing programs related to sustainability and climate change, fewer than half of these museums are actively measuring their progress toward sustainability [18]. Consequently, NEMO emphasized the importance of developing effective public policies to support the sustainable development of museums. The significant role of national cultural policies in addressing sustainability in museums is also discussed by Carvalho and Camacho [19], who argue that public policies can provide a valuable framework for promoting more sustainable practices in museums. Building on these ideas, this paper asserts that while developing public policies can provide museums with general direction, these policies must be adapted by each museum according to its unique context and characteristics.

Therefore, this paper aims to contribute to the existing literature in the field of museum management by providing empirical evidence from the Romanian museum sector on the role of environmental behavior, social responsibility, and economic performance in adopting a sustainability policy. The general questions addressed in this study are:

- What factors influence certain museums to adopt a sustainability policy?
- How do these factors influence the adoption of a sustainability policy in museums?

To answer these questions, this paper begins with a brief review of the theoretical concepts related to museum sustainability. The literature review is followed by a description of the research methodology and an analysis of the collected data. The fourth section presents three models illustrating the variables that can influence the adoption of a sustainability policy in museums. The results and implications of the study are discussed in the fifth section. Finally, the last section outlines the main conclusions, implications, and limitations and proposes several suggestions for future research. Since this study focuses on a sector that is empirically under-researched, it can offer new insights into the managerial actions needed to achieve a stronger commitment to sustainability in museums.

2. Literature Review and Hypotheses

2.1. Museums and Sustainability Policy

A sustainable museum sets sustainability goals, implements measures to achieve these goals, and evaluates its progress toward sustainability. Additionally, a sustainability-oriented museum seeks to cultivate a positive attitude toward sustainability among its visitors. This is achieved firstly by serving as an example of good practice and secondly by organizing exhibitions and activities that promote and explain sustainability principles [20].

Museums extensively engage in sustainability activities as part of their mission to serve society and positively influence the quality of people's lives [21]. Additionally, an increasing number of museums are trying to carry out their internal operations in a sustainable manner due to the high competition that exists for attracting funds. Since museums typically use public money and many countries face financial difficulties, funding bodies

are increasingly deciding to invest money in museums that have high performance and success in the market [22]. Thus, the interest of museums in measuring their performance is increasing [23,24].

In museums, as in private companies, sustainability is increasingly seen as an important factor in achieving success [25]. However, few museums have a well-established sustainability policy. Although the application of some sustainability principles can be observed in various museum activities, few institutions have formalized and effectively implemented a plan for sustainable development. As has already been argued in the literature, there are some pre-existing features and factors that influence organizations' decision to adopt a sustainability system. For example, Jansson et al. [26] found that sustainability practices, entrepreneurial orientation, and market orientation are important determinants of commitment to sustainability in small and medium-sized enterprises (SMEs). Other researchers have highlighted that lack of money, lack of a 'green policy', demotivated employees, lack of knowledge about sustainability, and negative attitudes among some employees are major barriers that prevent museums from becoming sustainable [27] (p. 231) [28] (p. 358).

Against this background, the current study starts from the idea that there are specific characteristics of museums that could represent explanatory variables for the existing differences in adopting a sustainability policy. In the context of this research, sustainability policy can be understood as a plan through which organizations incorporate sustainability principles, practices, and goals into their core business strategies [29–31].

To identify these characteristics, a good starting point is the definition associated with the concept of a sustainable museum. According to ICOM [32], a sustainable museum must preserve the heritage and "be an active and attractive part of the community". Chitima [27] (p. 227) stated that sustainable museums are those that use renewable resources and whose working processes do not harm the environment. Other researchers perceive sustainable museums as those that have enough resources to function and fulfill their goals [14,33]. By combining all these different views, this study uses the concept of sustainable museums in accordance with the triple-bottom-line approach, which requires a balance between the economic, social, and environmental pillars of sustainability [34]. As noted by Raut et al. [35], the integration of all three components of sustainability is very necessary but is not often addressed in the literature.

Based on these considerations, we claim that some aspects related to economic performance, social responsibility, and environmental behavior can impact the process of adopting and implementing a sustainability policy in museums. The hypotheses regarding the influence of different variables on adopting a sustainability policy are detailed below.

2.2. The Influence of Economic Performance on Sustainability Policy

Museums have an important economic role since they are a key component of touristic development strategies that help to increase residents' income and create jobs [36]. For example, Siu et al. [37] highlighted that museums contribute more to the UK economy than the car industry or the advertising and film industries. Additionally, Wickham and Lehman [38] argued that in 2009, cultural tourism generated approximately AUD ten million in the Australian economy, and tourists who were involved in cultural activities spent twice as much as those who did not participate in such activities. Another study estimated that European museums attract more than 370 million visitors annually, most of whom are tourists [39].

To make a high economic contribution and attract additional sources of income, many museums apply "management strategies similar to those used by private companies" [40]. These strategies include strategic alliances [41] (p. 219), licensing agreements for international expansion [42], diversification of services [43], and the manufacture of souvenirs inspired by museum collections and the sale of products worldwide through online stores [44]. The rise in museum corporatism [45] can be explained by the need of museums to improve their economic and financial results, which can be accomplished by

applying market strategies [14,46]. Moreover, recent research suggests that it is impossible for a museum to be sustainable without a viable business model [47].

An explanation for this behavior lies in the fact that the public subsidies received by museums are not always enough to meet all their cultural, social, and environmental goals. Thus, some museums that fail to adopt a market-oriented approach in their operations have suffered important financial cuts [48]. In turn, the lack of financial resources can be an important barrier to implementing a sustainability system within an organization [49]. Eco-friendly and green technologies require larger investments than traditional technologies. Heritage preservation, organizational development, and quality of life improvement are also objectives that cannot be achieved without money [50]. Therefore, we argue that economic performance is positively related to adopting a sustainability policy in museums.

H1. *Economic performance is positively related to sustainability policy in museums.*

The economic performance of museums is often discussed in connection with entrepreneurship or sustainability. Some studies have claimed that financial autonomy is an important indicator for measuring the economic sustainability of museums or the level of cultural entrepreneurship in museums [51]. Financial autonomy involves the diversification of the financing sources of a museum (public subsidies, donations, sponsorships, own revenues) [52] with the purpose of minimizing museum dependence on a single funder (such as government). An important way of achieving this autonomy is by using business models and applying the managerial strategies mentioned above. The direct benefit of this income diversification is the capacity of museums to have enough resources to fulfill all their objectives. In line with this argument, we believe that financial autonomy may have a positive influence on the ability of museums to implement a sustainability policy. Thus, we propose the following hypothesis.

H1a. *Financial autonomy is positively related to sustainability policy in museums.*

The activity of museums is also assessed in relation to several indicators related to the number of visitors, income level, souvenir shop sales, the number of mentions in mass media, and the number of publications and events [53]. To allow objective comparisons of performances recorded by museums of different sizes, these indicators are often expressed in terms of the resources that were allocated to obtain the results. Some examples are the cost of a museum visit, which is determined by dividing the level of expenditures by the number of visitors [53]; the rate of financial autonomy, which is determined as a ratio between earned income and total income [51]; and average labor productivity [41].

Therefore, we can conclude that efficiency and productivity are another important indicator used to assess economic performance in museums. Using resources efficiently and maximizing the output–input ratio and strategic allocation of resources to provide useful products and services to visitors are just some possible solutions that museums can implement to adapt to the new challenges and opportunities they face [54]. At the same time, efficiency is also one of the variables that influence the ability of a system to maintain its long-term vitality [55] and an essential requirement for ensuring the economic sustainability of an organization [56]. This factor allows for the continuous development of an organization without an equal increase in the consumption of resources [57]. Thus, a high level of efficiency and productivity is expected to facilitate the implementation of sustainability policy in museums. Hence, the following hypothesis can be formulated.

H1b. *Efficiency and productivity are positively related to sustainability policy in museums.*

2.3. The Influence of Environmental Behavior on Sustainability Policy

Cost-efficiency arguments are interconnecting the economy with the environment [58]. The efficient use of resources can increase profitability and is an important requirement of environmental protection [59]. By reducing the use of resources (energy, water, materials,

etc.), reusing resources whenever possible, and recycling materials that can no longer be used in their current form, museums can decrease their carbon emissions. Simple actions such as unplugging all non-essential devices overnight can offer serious reductions in energy expenditures. For example, De Silva and Henderson [60] showed that the installation of LED lighting reduced power consumption by up to 60% in the case of a science museum.

In addition to saving resources and reducing costs, a positive attitude of museums towards the environment can lead to increasing public confidence, engaging communities, gaining a competitive edge, attracting new audiences, attracting financial resources, and maintaining a clean environment for heritage objects, employees, and visitors [27] (p. 225). Integrating green practices into museum management also has a positive impact on the ability of museums to ensure an optimal microclimate inside the building, which is a very important requirement for keeping the heritage safe [61] (p. 2). Drought, fires, hurricanes, and floods caused by climate change are serious risk factors for maintaining heritage objects in optimal conditions. Thus, the actions adopted by museums to safeguard the environment can be regarded as the last stages of preventive preservation of their collections [61] (pp. 7–8).

In addition, many studies emphasize the key role that museums can play in protecting the environment through the educational activities they organize [62]. These institutions can offer exhibitions and cultural projects focused on sustainability principles and promote environmental sustainability through educational and learning services, publications, and their websites [63] (p. 18). However, such actions to influence visitors' behavior and attitudes can be carried out only after a museum has changed its own attitude towards the protection of the environment. Museums should be a model of good practice for their beneficiaries, which is why it is essential for them to demonstrate that they can implement the environmental protection measures they promote. Therefore, we argue that there is a positive relationship between environmental behavior and the implementation of a sustainability policy in museums.

H2. *Environmental behavior is positively related to sustainability policy in museums.*

2.4. The Influence of Social Responsibility on Sustainability Policy

Through the cultural heritage they manage, museums offer a direct way of discovering the characteristics and history of a community, and they therefore develop community identity and facilitate multicultural understanding and acceptance [64]. According to Price and Applebaum [65], cultural heritage can stimulate the sense of belonging which leads to social cohesion, the development of group identity, and the creation of stronger communities. Additionally, exhibitions, programs, activities, and events connect community members inside and outside museum walls, which facilitates interconnection and social interaction [66,67]. Thus, museums have the capacity to inspire people, to improve the quality of people's lives by diversifying recreational options, and to support social inclusion by engaging in activities aimed at attracting various groups of visitors [28] (p. 359).

However, these social benefits cannot be achieved in the absence of some products and services offered by museums. The most well-known museum product is the exhibition. Exposure of heritage to the public is a core responsibility of museums and justifies their efforts to collect, research, and preserve collections. In the absence of exhibitions, museums are little more than cemeteries for historical pieces [68]. However, an important issue for museums is the lack of exposure space, which results in many objects being kept in warehouses without being presented to the public for years. The problem is that keeping objects in a warehouse instead of exhibiting them is an activity that consumes resources and generates cost increases without providing immediate benefits to the public. For this reason, the continuous growth of collections beyond the existing research and exposure capacity is a factor that negatively influences the sustainability of museums [69]. Two solutions have been proposed for this issue. The first claims "that museums should dispose

of less important objects as they acquire new" objects [69]. The second solution states that museums can solve the problem of lack of exposure space by applying strategies such as opening satellite museums, organizing exhibitions in various locations outside the museum space, and renting/borrowing some exhibitions [41]. In addition to cost considerations, making the most of museum heritage through exhibitions is a way for museums to have a higher social impact. Therefore, we believe that there may be a positive correlation between heritage exposure and the adoption of a sustainability policy by museums.

H3. *Heritage exposure is positively related to sustainability policy in museums.*

Organizing exhibitions is a basic requirement for museums to be sustainable, but the social impact of these cultural products is influenced by the number of visitors museums succeed in attracting. The mere organization of exhibitions that have little attractiveness is not sufficient for museums to act as generators of social value. Therefore, in museums, the emphasis is shifting from collecting, preserving, and researching the heritage to performing these functions to provide public access to collections, with the purpose of generating long-term value and positive social change within the community [70,71]. Increasingly, museums are becoming organizations that help people understand the world by interpreting the past and present and exploring the future. The social role of museums was also debated by Mencarelli et al. [72], who argued that museums are increasingly places for sharing experiences. This hypothesis has been validated by Dragicevic and Letunic [73], who showed that the main reason for which the surveyed tourists chose to visit a museum was their wish to have a new experience. Thus, we can conclude that even a museum with a modest collection can be successful if it manages to create attractive exhibitions that involve all human senses and allow visitors to experience and even learn things in a fun way through various games [74–76].

However, museums differ in how they adopt these actions as part of their core responsibilities. Although many museums have chosen to reform their traditional management strategies by placing a high priority on visitors' needs [77], there are still numerous traditional institutions that believe that they exist solely to collect, preserve, and research heritage objects [78]. The experts from these museums typically perceive visitors as a factor that distracts them from achieving their goals, and they therefore place little importance on offering attractive products in the market [79]. The direct consequences of such behavior are a low flow of visitors and a low level of their own revenues, and the indirect consequence is the small contribution of these museums to social development.

Thus, to fulfil their social role, it is not enough for museums to focus only on the enrichment, preservation, research, and exhibition of heritage [80]; it is also necessary that they meet the needs and expectations of the visitors so that visitors want to purchase the products and cultural services provided by museums. According to Friedman [81], an organization "with strong social sustainability is deeply embedded, even loved, within its community". Therefore, a museum that does not prioritize visitors' preferences cannot fully realize its potential in generating benefits for society. For this reason, to be socially sustainable, museums must have a long-term positive attitude towards the public, be receptive to people's needs and interests [33], offer visitor-centered products [82], and permanently improve the quality of their services [83].

To conclude, the ability of a museum to produce a high social impact may be linked directly to the number of beneficiaries it manages to attract. In turn, the attractiveness of a museum (measured by the number of visitors) may be dependent on its openness to adapting its products and services to visitors' needs. Thus, we hypothesize that openness to the public is positively related to sustainability policy in museums.

H4. *Openness to the public is positively related to sustainability policy in museums.*

Social sustainability also includes the contribution of a museum to the general welfare of "local communities and the creation of a sense of place" [84]. To be relevant and socially

responsible, museums should encourage active citizenship, participation, and involvement of all social categories and ethnic minorities in their activities [85,86]. In this regard, Tlili [11] suggested that museums can carry out activities in partnership with local communities, public organizations, and NGOs. For example, museums can offer attractive volunteering programs, which is an excellent way for young people to develop skills and increase their chances of engagement and a good opportunity for pensioners to spend their leisure time in a useful and enjoyable manner [28] (p. 362). Engaging local residents in the museum's activities can enhance the positive social impact generated by the museum within the community. For this reason, any museum that seeks to become sustainable should consider collaborating with community members to implement various cultural and educational projects. We therefore hypothesize that community involvement is positively related to sustainability policy in museums.

H5. *Community involvement is positively related to sustainability policy in museums.*

3. Materials and Methods

The econometric methodology was selected based on the theoretical recommendations regarding the statistical characteristics of the collected data. Our dependent variable (DV) was sustainability policy, and it had a slightly asymmetric negative distribution and a small flattening. However, normality tests confirmed that the values for sustainability policy tended to have a normal distribution (Shapiro–Wilk = 0.971, sig. = 0.112), which allowed us to apply the classical linear regression methodology. Given these characteristics of our data and the fact that we also introduced control variables into the model, we used generalized linear models (GLMs) to test our hypotheses. The GLMs were fitted to the data using the maximum-likelihood method [87]. Within the GLM, a linking function (g) established the connection between the conditioned mean of sustainability policy and the linear predictor:

$$g(\overline{P}) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k \quad (1)$$

where $X = (X_1, X_2, \ldots\ldots X_K)$ represents the set of predictor and control variables. The six predictors or independent variables (IVs) represented measures of financial autonomy, efficiency and productivity, environmental behavior, heritage exposure, openness to the public and community involvement. To prevent spurious correlations, we ensured data quality by cleaning and preprocessing datasets to remove outliers, missing values, or errors that could introduce bias into the analysis. Additionally, we included control variables that could influence both the independent and dependent variables. The selected control variables comprised the relevance of museums, membership in a museum complex, membership in the National Network of Romanian Museums, and the type of museum (unique or mixed).

The relationship between sustainability policy and the IVs was studied by using a quantitative approach and IBM SPSS software (version 22). Since our purpose was to be able to express some conclusions about museum sustainability as generally as possible and because the literature in this field typically presents case studies or qualitative research that does not allow a high generalization of the results, we decided to carry out an electronic survey of the Romanian museums.

3.1. Sample and Procedures

Data were collected from a sample of 186 Romanian museums between October 3 and 29 November 2016. The sample included all Romanian museums that had a different general manager and a valid email address listed in the "Museums and Collections in Romania" database. Museums with the same management board and organizational structure were counted only once, and each museum was limited to providing a single response. This measure was necessary because in Romania, there are cases where multiple museums are collectively managed as a museum complex by a single general manager. For example, the Moldova National Museum Complex includes eleven museums, such as

the Palace of Culture, the Art Museum, the History Museum, the 'Mihail Kogălniceanu' Memorial Museum, and others. However, these eleven museums operate under a single budget and Administrative Council, and they do not have the autonomy to develop different procedures, rules, objectives, and strategies independently. All decisions for these museums are made by the general manager in collaboration with the Administrative and Scientific Councils. Due to the multidisciplinary nature of the questions, we recommended that the questionnaire be completed by museum managers or by other senior executives who had an overall view of the organization and possessed information about all processes conducted by the museum. After several email and phone reminders, valid responses were received from 86 museums, resulting in a response rate of 46.23%.

According to the National Institute of Statistics (NIS), the Romanian network of museums and public collections comprised 390 units in 2015 after excluding branches, satellite museums, monuments, botanical gardens, zoos, natural reservations, dendrological parks, and aquariums [88]. The representativeness of responses based on this value and the type of museum or collection is presented in Table 1.

Table 1. Representativeness of survey responses by museum type.

Type	Museums and Public Collections				Representativeness (Number of Responses/Total Number of Units)
	Number of Responses		Total Number of Units in Romania		
Art	12	13.95%	96	24.62%	12.50%
Archeology and history	12	13.95%	59	15.13%	20.34%
Natural history and science	9	10.47%	10	2.56%	90.00%
Technology and science	5	5.81%	14	3.59%	35.71%
Ethnography and anthropology	9	10.47%	119	30.51%	7.60%
Specialized	4	4.65%	29	7.44%	13.79%
General and mixed	35	40.70%	63	16.15%	55.56%
TOTAL	86	100%	390	100%	22.05%

Source: [88].

However, out of the total 390 units, we excluded public collections because their activities and aims are generally less complex compared to those of museums, and they often do not function as independent organizations. Therefore, our sample consisted of 186 Romanian museums. The representativeness of responses based on this sample and the relevance of museums is presented in Table 2.

Table 2. Representativeness of survey responses by the relevance of museums.

Type	Museums and Public Collections				Representativeness (Number of Responses/Total Number of Units)
	Number of Responses		Total Number of Units in Romania		
National museums	23	26.74%	50	26.88%	46.00%
Regional museums	12	13.95%	21	11.29%	57.14%
County museums	30	34.88%	57	30.65%	52.63%
Local museums	21	24.42%	58	31.18%	36.21%
TOTAL	86	100%	186	100%	46.23%

From a geographical point of view, the questionnaire was completed by museums from all 8 development regions in Romania. Additionally, the 86 collected responses were received from all types of museums (art, history, archaeology, ethnography, memorials, natural history, science, etc.). To perform the statistical analysis, the museums were regrouped into two categories according to their type: mixed (58.15%), which hold different types of heritage objects (e.g., art and history), and unique (41.9%). Regarding the relevance of museums, the structure of the responses was as follows: national museums (26.7%), regional museums (14%), county museums (34.9%), and local museums (24.4%). Other

criteria for grouping the museums were belonging to a complex of museums (24.4% responded affirmatively) and belonging to the National Network of Romanian Museums (61.6% responded affirmatively). The structure of responses was compared with the data available at the national level, and the responses were found to be representative for the total statistical population.

3.2. Measures

To assess different dimensions of museum sustainability, a five-point Likert scale (1—strongly disagree, 5—strongly agree) was used. The DV, sustainability policy, was assessed using a total of eight items (scale mean = 3.02, SD = 0.96) adapted from the sustainability checklist published by the Museums Association [89]. The scale for financial autonomy consisted of four items that were adapted from the works of Toepler [43], Pop and Borza [90] and Rentschler and Geursen [51]. These items measured the ability of a museum to have enough financial resources to fulfill its objectives based on offering a wide range of attractive goods and services to its visitors. Efficiency and productivity were measured by using seven items based on the works of Pop and Borza [90], Worts [53], and Griffin and Abraham [54]. These items considered different ratios between the number of employees, number of visitors, number of events, level of own income, level of total revenues, income from selling tickets, level of total expenditures, number of objects exposed, and size of exposure area. The environmental behavior scale assessed the actions implemented by a museum to optimize the consumption of electricity, water, energy, materials, and fuels by using five items built on previous studies [59,60,91]. Two additional items were included to measure the use of renewable resources and a museum's involvement in promoting environmental principles through its exhibitions or educational activities [62]. Unfortunately, these two items were removed from the final analysis because they did not load well with the other items. Finally, the measurement items of the three IVs referring to social responsibility were adapted from the works of Merriman [69], Pop and Borza [90], Tlili [11], and Stylianou-Lambert et al. [84]. Heritage exposure was assessed using two questions relating to the degree of public exposure of heritage objects. Openness to the public was measured through seven items relating to the capacity of a museum's offer to be in accordance with consumers' needs, demands, and desires. Finally, the community involvement scale consisted of three items relating to the steps taken by a museum to engage community members in its activities. A summary of the distribution of responses for each item is presented in Appendix A.

After the end of the data collection procedure, the reliability and internal consistency of the answers were tested. The statistical results presented in the third column of Table 3 denote that the internal consistency of each proposed scale is good. The Cronbach's alpha coefficient was higher than 0.7 for all latent variables, which means that the items included in the scales significantly influenced the latent variables [92]. The next step was to use factor analysis (principal component analysis (PCA)) to identify the relations that express the link between the items and the latent variables they determine. For each of the variables, we checked the opportunity to apply PCA using the Keiser–Meyer–Olkin Test (KMO) and Bartlett's test of sphericity (approximating chi-square). Given the results presented in Table 3, we could express all latent variables as a linear combination of items.

Table 3. The results of testing the validity and reliability of each scale.

Latent Variables	No. of Items	Cronbach's Alpha Coefficient	KMO	Bartlett's Test of Sphericity	*p*-Value	Total Variance Explained (%)	Factor Loadings (Component Matrix)
Environmental behavior (EB)	5	0.922	0.876	328.785	0.000	76.327	>0.70
Heritage exposure (HE)	2	0.727	0.524	26.748	0.000	76.177	>0.80
Openness to the public (OP)	7	0.783	0.780	157.241	0.000	45.004	>0.52

Table 3. *Cont.*

Latent Variables	No. of Items	Cronbach's Alpha Coefficient	KMO	Bartlett's Test of Sphericity	*p*-Value	Total Variance Explained (%)	Factor Loadings (Component Matrix)
Community involvement (CI)	3	0.710	0.668	47.146	0.000	63.368	>0.76
Financial autonomy (FA)	4	0.784	0.786	97.105	0.000	61.997	>0.55
Efficiency and productivity (EP)	7	0.841	0.808	219.429	0.000	51.470	>0.59
Sustainability policy (SP)	8	0.910	0.888	407.79	0.000	62.099	>0.70

4. Results

After the application of factor analysis (PCA), synthetic variables were generated; based on these variables, the data processing was continued to test the research hypotheses. Both the DV (sustainability policy) and the exogenous latent variables (financial autonomy, efficiency and productivity, environmental behavior, heritage exposure, openness to the public, community involvement) were standardized variables with mean = 1 and SD = 0. The six IVs had the role of predictor in the analyzed models, and all of them had a significant influence on sustainability policy (see Table 4, first column).

Table 4. Correlation matrix of dependent and independent variables.

	SP	FA	HE	OP	CI	EP	EB
Sustainability policy (SP)	1						
Financial autonomy (FA)	0.423 ***	1					
Heritage exposure (HE)	0.398 ***	0.249 *	1				
Openness to the public (OP)	0.633 ***	0.467 ***	0.313 **	1			
Community involvement (CI)	0.534 ***	0.460 ***	0.250 *	0.661 ***	1		
Efficiency and productivity (EP)	0.368 ***	0.523 ***	0.096	0.533 ***	0.431 ***	1	
Environmental behavior (EB)	0.572 ***	0.299 **	0.354 **	0.607 ***	0.437 ***	0.436 ***	1

*** $p < 0.001$ (2-tailed), ** $p < 0.01$ (2-tailed), * $p < 0.05$ (2-tailed).

Moreover, the correlation matrix showed a strong correlation between openness to the public and most of the IVs. Thus, openness to the public was excluded from the analysis to avoid the multicollinearity effect. Since there was an average correlation between financial autonomy and efficiency and productivity, we developed three models: two in which financial autonomy was not included in the analysis (M1 and M2) and one in which efficiency and productivity was excluded (M3). This approach allowed for the development of meaningful models used to explain the sustainability policy variation. The results obtained from the estimation of the three econometric models are presented in Table 5.

Table 5. The results of estimated models for sustainability policy.

Model / Variable	M1		M2		M3	
	Coeff.	Wald Test	Coeff.	Wald Test	Coeff.	Wald Test
Type (TY, mixed)	−0.043	0.058	−0.099	0.349	−0.094	0.314
Complex (CM, yes)	0.167	0.725	0.225	1.498	0.231	1.573
Network (NW, yes)	−0.201	1.313	−0.142	0.746	−0.123	0.567
Relevance (RE)						
Regional museums	0.492 *	3.270	0.432 *	2.883	0.376	2.151
National museums	0.289	1.572	0.193	0.786	0.177	0.638
County museums	0.634 ***	8.239	0.581 ***	7.876	0.526 ***	5.420
Efficiency and productivity (EP)	0.178 *	3.688	0.076	0.702	-	-

Table 5. *Cont.*

Variable \ Model	M1		M2		M3	
	Coeff.	Wald Test	Coeff.	Wald Test	Coeff.	Wald Test
Heritage exposure (HE)	0.223 **	5.983	0.135	2.329	0.123	1.916
Financial autonomy (FA)	-	-	-	-	0.066	0.496
Community involvement (CI)	0.385 ***	17.130	0.308 ***	11.786	0.304 ***	10.586
Environmental behavior (EB)	-	-	0.330 ***	12.486	0.351 ***	15.663
Intercept	−0.266	1.816	−0.240	1.693	−0.225	1.392
R squared	0.45		0.519		0.518	
LR test	51.351 *** (df = 9)		63.01 *** (df = 10)		62.806 *** (df = 10)	

* Indicates significance at the 10% level or less, ** significance at the 5% level, *** significance at the 1% level.

The statistical significance of the regression coefficients was tested by comparing the calculated test statistic W to the critical value from the chi-square distribution with 1 degree of freedom. The overall fit of nested models was assessed by using the likelihood ratio (LR) test. The results presented on the last line of Table 5 indicate that in all three models, the null hypothesis of jointly insignificant coefficients of explanatory variables was rejected.

5. Discussion

The analysis of the control variables included in the three models revealed that the sustainability policy of a museum is not dependent on its profile, whether it belongs to a museum complex, or its membership in the National Network of Romanian Museums. Regarding the relevance of museums, there were no significant differences in the adoption of a sustainability policy by local and national museums. However, significant positive coefficients were observed for county and regional museums, indicating that the adoption of a sustainability policy is higher among county and regional museums compared to local museums (settled as the reference category).

The third model was developed to analyze the influence of financial autonomy on sustainability policy. Since the coefficient associated with this variable was not significant, hypothesis H1a, which states that financial autonomy is positively related to sustainability policy in museums, is rejected.

Regarding efficiency and productivity, the first model shows that this variable had a low positive influence on sustainability policy at the 10% significance level. Additionally, efficiency and productivity were nonsignificant in the second model, which included the variable environmental behavior. Therefore, hypothesis H1b can be accepted with a confidence level of 90% only if the effect of environmental behavior on sustainability policy is ignored. Given that financial autonomy does not have a significant influence on sustainability, while efficiency and productivity has just a low positive influence on sustainability in the first model, we can state that economic performance is not highly important in the adoption of sustainability policies in museums. Thus, hypothesis H1 is rejected.

A possible explanation for this result could be that Romanian museum managers are not very preoccupied with economic aspects; their objectives are predominantly connected with cultural and social issues. Additionally, most Romanian museums are financed almost entirely based on subsidies received from the state budget [41] (p. 275). Since the government covers the operating costs and frequently even the development expenditures of museums, the motivation to seek out and attract alternative sources of income is quite low among museum managers. With few exceptions, the same situation is also present in museums in other European countries [78]. Even large museums such as the Louvre and the Hermitage are funded from their own revenues in a proportion of approximately 50%, and the difference is obtained from public subsidies [41].

Additionally, the low influence of efficiency and productivity on sustainability policy can be attributed to the fact that Romanian museum managers are not always constrained to adopt productivity-enhancing measures to achieve their goals since they use predominantly

public funds. Usually, the museum managers' interest is directed towards influencing and persuading decision-makers to allocate a budget that is sufficiently high to cover the necessary expenses of the museum. Thus, as long as managers succeed in obtaining public subsidies equal to or above the annual expenditures of their institution, they consider that their task to ensure the economic sustainability of the museum has been fulfilled.

Environmental behavior proved to be a significant influence factor for sustainability policy in both M2 and M3; therefore, H2 is accepted. This result is not surprising given that the protection of the natural environment is the first and most intensely debated pillar of sustainable development [59], because without natural resources, it is impossible to ensure adequate living conditions and particularly economic development. Additionally, environmental protection is the best-known dimension of sustainability among the public and implicitly among museum managers [90]. Thus, there is a natural tendency to associate sustainability primarily with the environment.

Heritage exposure was significant at the 5% level in the first model, which allows us to accept H3. However, it should be noted that heritage exposure moderately influenced a museum's sustainability policy only when it was analyzed alone (Table 4) or in combination with economic and social sustainability variables (model 1).

Due to the multicollinearity effect, the link between openness to the public and sustainability policy could not be analyzed in a generalized linear model. Although our estimated models did not provide any evidence for accepting or rejecting H4, the strong positive correlations between openness to the public and the other variables presented in Table 4 suggest that this factor plays a highly important role in the adoption of sustainability policies by museums.

Community involvement was significant at the 1% level; therefore, H5 is accepted. Notably, this variable was the only variable that had a significant positive influence on sustainability policy in all three models. One possible explanation might be that the mission of museums and the purpose for which they exist is to improve the quality of people's lives by creating social value [93], which cannot be achieved without consultation from and involvement by locals in museum activities. While the main purpose of private companies is to make a profit, museums exist to generate a positive socio-cultural impact on their communities. For this reason, a connection between the purpose of the organization and the more prominent manifestation of one or more of the sustainability pillars can be observed. If the economic dimension of sustainability is the most important dimension for for-profit organizations, this research conducted in a nonprofit sector reveals that after environmental behavior, social responsibility is the variable with the strongest influence on sustainability policy.

Figure 1 illustrates that adopting a sustainability policy is the first step in the process of the sustainable transformation of museums, followed by defining sustainability goals, updating internal regulations and procedures, developing sustainability strategies, and ensuring proper staff training on sustainability issues and practices. Only after completing these stages is it recommended to implement various measures for sustainability improvement, followed by measuring the results, comparing them with the established objectives, identifying the causes of positive or negative deviations, and proposing future directions for action. This approach is also advocated by the NEMO Working Group on Sustainability and Climate Action, which recommends initiating sustainability implementation in museums with a written sustainability concept [94].

While Carvalho and Camacho [19] emphasized the importance of adopting national public policies to support museums in integrating sustainability approaches into their practices, our research focuses on developing a sustainability policy within a museum. Applying the same policy to all museums is equivalent to imposing identical missions, objectives, and strategies on each museum. However, different museums face different challenges in contributing to the United Nations' 2030 Agenda [95], and therefore, they should develop their sustainability policies in accordance with their specific contexts and characteristics [96].



Figure 1. The stages of museum sustainable transformation.

The problem is that many museums have implemented various sustainability programs and even measured their sustainability progress without first establishing clear sustainability policies, goals, and strategies. At present, sustainability policy in many museums often remains as an ideological commitment, with only a few museums having a written sustainability policy (an example of which can be found at The Museum of Contemporary Art Australia) [97]. Therefore, we argue that in order to enhance museums' contribution to the global well-being and to the achievement of the 17 Sustainable Development Goals proposed by the United Nations' 2030 Agenda [95], it is crucial to define not only the mission and vision statements of a museum but also its sustainability policy in written form. Additionally, greater emphasis must be placed on adequately training museum staff in sustainability. This aspect is also supported by the NEMO report [18], which highlighted that over 66% of the surveyed museums "do not have sufficient knowledge about the UN Sustainable Development Goals and climate action".

6. Conclusions

This paper assessed how sustainability policy is related to economic performance (financial autonomy, efficiency and productivity), environmental behavior, and social responsibility (heritage exposure, openness to the public and community involvement) in the museum sector.

Based on responses collected from 86 Romanian museums, three GLMs were developed, and research hypotheses were tested. Our overall conclusion is that the adoption of a sustainability policy by a museum is positively associated with environmental behavior and with some socio-cultural actions such us involving community members in current activities, creating attractive exhibitions, and offering educational or inclusive programs for different groups of people. The links between sustainability policy, financial autonomy, efficiency, and productivity were almost nonsignificant when they were analyzed together with other variables in an econometric model, even if they existed in the correlation matrix (Table 4). These findings imply that if museums seek to enhance their sustainability

results, they should focus their attention on social and environmental issues rather than commercial and economic indicators. Museums that adopt an open attitude towards the public, place importance on their social role, and engage in responsible behavior towards the environment are those that will be more prone to implement a sustainability policy. In contrast, museums that consider that they exist only to enrich and preserve the cultural heritage often display an unfriendly attitude towards both visitors (who are regarded as disturbing factors that endanger the preservation of exposed objects) and the environment. These conclusions support other findings that highlight the important role that museums can play in sustainable development through their services, educational programs, and activities if they are well managed [84].

The results of this research offer important contributions to the current literature. First, the study develops the theory of museum sustainability by highlighting the link that exists between different predictors and sustainability policy. Previous research has focused primarily on identifying the mission and role played by museums in the sustainable development of their regions. Through the correlated analysis of these concepts, we succeeded in showing that the adoption of a sustainability policy is closely linked to the extent to which a museum fulfils its social role and takes care of the environment through rational use, reuse, and recycling of natural resources. Moreover, in addition to the theoretical argumentation of these connections, the importance of this paper also lies in the fact that it highlights the extent to which different variables influence the adoption of a sustainability policy. At the same time, given that the literature dedicated to the concept of sustainable museums is rather limited and typically involves theoretical studies or qualitative research, the present paper is relevant in that it contributes both to the enrichment of the theoretical knowledge and to the development of quantitative research in this field. From a practical point of view, this research is also useful for museum managers since it provides a more accurate picture of the characteristics associated with a sustainable museum. Additionally, the data presented in this paper can be used by managers to make proper decisions and take appropriate actions to implement a sustainable management system.

However, the results should be interpreted in light of their limitations. One limitation was the sample and its geographical distribution. While the study results were representative of Romanian museums, further research is needed to validate and extend our findings internationally. The fact that the paper takes a top-down approach, reflecting only the perspective of museum managers, could be considered a limitation as well because managers may have a tendency to provide a more favorable assessment of their museum to align with prevailing trends.

Another limit relates to the variables used to measure economic performance. The current research tried to assess the economic performance of museums with indicators similar to those used by private organizations (e.g., efficiency and productivity). Since the literature dedicated to the economic success of museums is abundant, it is possible that a different conceptualization of these variables would lead to a different result. Unlike private organizations, the ability of public institutions to obtain enough financial resources to fulfill their goals is not always dependent on the income they earn directly by selling their products and services. Many times, public organizations are financed wholly or partly by state subsidies. Thus, future research could focus on studying the link between the willingness of government bodies to finance museums and the adoption of a sustainability policy. Additionally, the economic impact generated by a museum in the community may reflect its economic performance better than efficiency, productivity, and financial autonomy. Therefore, future studies could analyze whether there is any association between sustainability policy and the indirect impact generated by museums in the economy through cultural tourism. At the same time, in addition to the variables that have been identified, there may be other variables that should be considered to assess the ability to implement a sustainability policy in a museum. For example, it would be useful to analyze whether the relationship between management and employees or the degree of

employee satisfaction in the workplace are factors that could influence sustainability policy. Although we conducted a thorough theoretical study of the variables and included control variables in the statistical analysis, spurious correlations between variables may still exist. Therefore, further longitudinal studies should be conducted to observe changes over time and establish temporal relationships.

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Appendix A. Descriptive Statistics of the Items

Items	Mean	Median	Std. Deviation	Skewness	Kurtosis
Heritage exposure					
The museum exhibits a very high proportion of its heritage objects	2.640	3	1.217	0.047	−1.244
The heritage objects which are not exhibited in the museum can be visited at exhibitions organized in other locations or museums	2.767	3	1.234	−0.043	−1.138
Openness to the public					
The permanent exhibition/exhibitions of the museum are very attractive to the public	4.024	4	0.951	−0.898	0.795
Messages left by visitors in the museum's guestbook and/or Facebook page are reviewed in order to adopt improvement measures	4.093	4	1.002	−1.269	1.572
The museum's exhibitions and programs are accessible and inclusive	4.012	4	0.861	−0.816	0.868
The museum allows community members to organize various events, local meetings, and exhibitions in its spaces and buildings	4.070	4	1.156	−1.215	0.611
The museum aims to attract new users and/or disadvantaged groups of people	3.721	4	1.025	−0.619	−0.181
The museum staff and volunteers are diversified enough to reflect the structure of the local community	3.442	4	1.036	−0.459	−0.207
The museum offers participative and interactive educational programs	4.116	4	1.022	−1.320	1.529

Items	Mean	Median	Std. Deviation	Skewness	Kurtosis
Community involvement					
The local population is consulted and involved in the activities of the museum	3.326	4	1.173	−0.531	−0.469
The museum offers opportunities for acquiring work experience and skills	3.709	4	1.072	−0.798	0.404
The volunteer opportunities offered by the museum are attractive to community members	3.500	4	1.156	−0.843	0.087
Environmental behavior					
The museum has implemented measures to increase the efficiency of electricity consumption	3.198	3	1.353	−0.340	−1.039
The museum has implemented measures to increase the efficiency of thermal energy consumption	3.279	3	1.343	−0.439	−0.849
The museum has implemented measures to improve the efficiency of water consumption	3.174	3	1.312	−0.299	−0.941
The museum has implemented measures to improve the efficiency of office materials consumption	3.477	4	1.234	−0.637	−0.487
The museum has implemented measures to improve the efficiency of fuel consumption	3.326	3	1.278	−0.430	−0.669
Financial autonomy					
The museum has a very diverse range of products for sale in the store	3.070	3	1.421	−0.176	−1.365
The museum offers a wide range of services to its visitors	3.326	3	1.079	−0.341	−0.474
The museum has enough financial resources to meet its objectives	2.953	3	1.336	−0.065	−1.242
The stock turnover is high	2.558	3	1.036	0.004	−0.626
Efficiency and productivity					
The ratio between the annual number of events organized by the museum and the average number of employees is high	3.884	4	0.975	−0.619	−0.188
The ratio between the annual number of visitors registered by the museum and the average number of employees is high	4.023	4	1.116	−1.033	0.278
The ratio between the annual income earned by the museum and the average number of employees is high	3.302	3	1.275	−0.417	−0.699
The average number of visitors registered by the museum per square meter of exposure area is high	3.605	4	1.109	−0.642	−0.114
The ratio between the museum's revenue from the sale of tickets and the number of objects exhibited in the museum is high	3.023	3	1.148	−0.285	−0.613
The ratio between the annual number of visitors and the museum's total expenditure is high	3.000	3	1.052	−0.435	−0.528
The share of own revenues in the total revenue earned by the museum is high	2.802	3	1.273	0.206	−0.892

Items	Mean	Median	Std. Deviation	Skewness	Kurtosis
Sustainability policy					
Sustainability principles are explained and promoted through displays, exhibitions, and the use of collections	2.814	3	1.193	0.029	−1.129
The museum's achievements in becoming sustainable are communicated to the public	3.023	3	1.217	−0.125	−0.996
The museum compares its sustainability performance with the performance of other museums and organizations	2.674	3	1.221	0.217	−0.994
The museum has sustainability goals	3.197	3	1.263	−0.383	−0.898
The museum takes steps to become sustainable	3.348	4	1.082	−0.853	0.144
The impact of museum projects on the natural and social environment is assessed	3.081	3	1.229	−0.313	−0.876
The museum staff is trained on environmental issues and practices	3.232	4	1.360	−0.377	−1.104
The museum's progress in achieving its sustainability goals is measured periodically	2.802	3	1.176	−0.182	−1.119

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