ECONOMIC PERSPECTIVES AND THE ROLE OF TECHNOLOGY IN CULTURAL HERITAGE PROTECTION AND SUSTAINABLE DEVELOPMENT

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Abstract: *The analysis of an economic perspective on cultural heritage was carried out until the 1900s using theories from cultural economics. However, practice at that time showed the need to create a new branch that would look specifically at cultural heritage, beyond the cultural theories that existed in cultural economics at the time. This led to the emergence of a new concept: Economics of Heritage. In this context, there were voices in the literature (artists, archaeologists, cultural practitioners) who believed that a translation of cultural heritage in economic terms was in fact an unnatural trivialisation and materialisation of heritage, which would have a degrading effect on it. These effects would be represented by the commercialisation, devaluation, destruction, and improper exploitation of cultural heritage to gain economic benefits from it. On the other hand, recent studies promote the economic utilization of cultural heritage and the utilization of artificial intelligence in virtual and augmented reality technology, with the purpose of increasing measures of cultural heritage protection. This article proposes an analysis of both theoretical approaches, while including the role technology plays in the shift of the economic perspective on culture and cultural heritage and accentuates the role of a new framework for cultural heritage protection, in line with concepts such as sustainability and sustainable development..*

Keywords: cultural heritage, virtual reality, digitalization, economic development, sustainability of cultural heritage.

1. Introduction

The analysis of an economic perspective on cultural heritage was carried out until the 1900s using theories pertaining to cultural economics. However, practice at that time showed the need to create a new branch that would look specifically at cultural heritage, beyond the cultural theories that existed in cultural economics at the time. This led to the emergence of a new concept: Economics of Heritage. In this context, there were also voices in the literature (artists, archaeologists, cultural practitioners) who believed that a translation of cultural heritage in

economic terms was in fact an unnatural trivialisation and materialisation of heritage, which would have a degrading effect on it. These effects would be represented by the commercialisation, devaluation, destruction, and improper exploitation of cultural heritage to gain economic benefits from it. Moreover, the same scholars argued that, while financial benefits can be gained from cultural heritage, these are only short-lived and the long-term effects of using cultural heritage for economic purposes are negative. On the other side, studies and statistics conducted in the last 20 years by experts, scientists, NGOs, countries and reputable international organizations like the European Commission, show that an economic evaluation and utilizations of cultural heritage, not only does not negatively impact it, but it provides the proper framework for cultural heritage protection and conservation in a time of uncertainty and decline. This article proposes an analysis of both approaches, while including the role technology plays in the shift of the economic perspective on culture and cultural heritage. The purpose of this paper is to present the arguments in favour of the economic use of cultural heritage, as well as to present ways in which this economic utilisation can be done without affecting the preservation of cultural heritage sites and objects.

In the first part of the article, we analyse the economic value given to cultural heritage (in ways of direct and indirect use, as well as non-use, and how innovative technologies such as virtual reality and augmented reality can be used to protect and preserve cultural heritage, while maintaining its economic use. The second part is dedicated to the concept of „paradox of authenticity" in relation to the reinterpretation of cultural heritage with technology. Lastly, we focus our attention on a new concept in the field's literature: the Eco-Sufficiency Perspective.

Methodologically, the paper addresses and analyses the economic perspectives and uses of virtual reality and augmented reality to promote and protect cultural heritage, using the classical bibliographical review together with document analysis and data analysis, in a CLR mix. This mixed method of research allows for a coherent and deeper understanding of the theme, overlapping multiple conceptual frameworks in a multidisciplinary approach on cultural heritage studies (Onwuegbuzie and Frels, 2016, 1-28).

2. The issue with economic evaluation of heritage

Cultural heritage can play a significant role in sustainable development, providing a basis for social and economic development, creating job opportunities, and promoting cultural diversity and social cohesion. Cultural tourism, for example, can generate income for local communities while promoting the preservation of cultural heritage. In addition, traditional knowledge and practices can be harnessed for sustainable resource management and conservation. At the same time, sustainable development can contribute to the preservation of cultural heritage. Development projects that take cultural heritage values into account help to preserve historic buildings and landscapes, while ensuring a socially and environmentally responsible development process. This process makes the relationship between cultural heritage and sustainable development one of interdependence, with the aim of promoting social, economic, and environmental sustainability.

For many years, experts believed that obtaining financial and economic benefits by using cultural heritage was a mistake, a trivialisation that would result in the destruction of heritage on the long run. Moreover, the same scholars argued that while financial benefits can be gained from cultural heritage, they are only short-lived and the long-term effects of using cultural heritage for economic purposes are negative. The arguments against the use/commercialisation of cultural heritage were:

The possibility of degradation of cultural heritage. The more popular a heritage site is, the more intensively it will be visited and therefore the more "worn out". The problem with the use of cultural heritage is that it cannot be restored to its original form without losing its cultural importance once it has been degraded.

Preservation of cultural heritage used for economic purposes is not financially sustainable. The costs of preserving and protecting cultural heritage are far too high compared to the benefits of its exploitation. These costs are not financially sustainable and cannot be covered by the heritage owner without subsidies or external funding.

Artificially increasing demand for cultural heritage. Some heritage objects are popular and will be exploited economically without understanding their cultural significance. This artificial increase in demand for a cultural site leads to degradation on an image basis, not on a cultural basis. This effect, also known as the "Venetian dilemma" (Peacock and Rizzo, 2012),

causes degradation of cultural heritage without, in return, providing a higher level of culturalization for visitors.

3. The value of heritage and use of the enhanced reality technologies

In his paper, "Heritage Economics: Coming to Terms with Value and Valuation", (Throsby, n.d.) Throsby argues that the involvement of economists in the field of cultural heritage is not intended to degrade culture, but rather to contribute to the overall understanding of the societal values involved in the management of cultural heritage conservation and to provide new directions and guidance in this area. This paper highlights three areas of research from an economic perspective when it comes to cultural heritage: the theory and applications of economic analysis on heritage issues, valuation methods and their relevance to the estimation of cultural value and the economic impact of heritage policies. A relevant perspective on the economic impact of cultural heritage on sustainable development is given for the first time in the field of scientific research by El Sarafi, in 1999, in "The Environment as Capital", where he compares the concept of natural capital with that of cultural capital (especially from a sustainability perspective). Eighteen years later, the idea is taken up by Throsby, who describes the concept of sustainable cultural development as having similar elements to environmental sustainability. Cultural management is thus integrated into the overall framework of sustainability and is used as a factor in the formation of environmental public policies.

From an economic perspective, the value of cultural heritage is determined by the benefits of its direct use (extractive/consumptive), indirect use (non-extractive) and even non-use. When we refer to the extractive or direct value of cultural heritage, we mean what we are willing to physically pay to benefit from a particular space, place, asset, heritage item (whether we are talking about buying it, renting it, or buying a ticket to visit it). The indirect value of heritage is the mere existence of the heritage object, which increases the value of its surroundings (aesthetic value, recreational value). An example of this is the increased value of real estate near a cultural site, or the higher prices charged by cafés, restaurants, and pubs near heritage sites. The value of not using cultural heritage is the most difficult to estimate but it cannot be ignored. This refers to the particular situations where a heritage object is more valuable when it is not exploited and implies that its very use for some purpose may reduce its value by damaging it. For example,

for some indigenous peoples, a sacred site is more valuable if it is protected and access to it is restricted. Its very existence gives it value for that cultural group and using it for tourism purposes can reduce that value.

The European Commission argues that cultural heritage is of significant economic importance, particularly for the cultural and creative sectors surrounding it. At the same time, cultural heritage "is an important resource for economic growth, employment and social cohesion, with the potential to revitalise urban and rural areas and promote sustainable tourism." (European Commission, 2022)

But what are the levers we can employ to make the economic use of cultural heritage more effective, while protecting and preserving it? The answers can be diverse. In this paper we will focus on innovative AR/VR/MR (augmented reality/virtual reality/mixed reality) technologies and how they contribute (or have the potential to contribute) to the process of protecting and preserving cultural heritage in the context of sustainable development. These types of immersive technologies are those that allow the barrier between the real and virtual worlds to be reduced, even dissipated, allowing users to perceive an immersion in time and space that cannot be experienced otherwise. Theorising on the importance of immersive technologies is still in its infancy and the literature on the subject is limited. However, existing studies show a high interest in the inclusion of augmented and virtual reality elements in the cultural domain. (Suh and Prophet, 2018) Virtual heritage, as the merging of culture and technology, represents a 'cross-fertilisation' of the disciplines of virtual reality (VR) and cultural heritage. This new field encompasses not only culture, but also elements of virtual archaeology, art in virtual space, anthropology, etc. In "Digital Cultures, Lived Stories and Virtual Reality", Maschio proposes a new cultural paradigm, according to which digital space is an opportunity to rethink and reinterpret cultural communities.

The application of virtual and augmented reality in the context of cultural heritage can serve two purposes: the promotion and sustainable use of heritage and its conservation, restoration, and protection. Virtual heritage incorporates reality-based interactive technologies in an intangible space. This creates a visual (sometimes tactile) representation of monuments, artefacts, buildings, and other heritage objects that can be used as educational material to improve the process of analysing historical events, or that can be exploited economically. As

mentioned at the beginning of the article, one of the main concerns when it comes to tangible cultural heritage is its preservation in the context of sustainable development. However, heritage is fragile and ancient, and inefficient use or excessive exploitation can have unfortunate effects on it. Innovative technologies such as Virtual Reality and Augmented Reality have the potential to provide a unique cultural experience when visiting a place, thus preserving its integrity and reducing the impact of tourism on it. The arguments in favour of using VR and AR technologies are manifold and can be divided into three categories: time, space, and sustainability.

When it comes to time, the use of VR and AR technologies allows us to access the cultural heritage of periods that we would not have physical access to in the real world. For example, through a virtual exercise we can re-enact a scene from 500 years ago using the physical resources we have, to which we can add artificial reconstructions of the architecture of the time, the music of the era, the clothing, the customs, and many other things. Virtual and augmented reality allow people living in the 21st century not only to read about the reality of a past time, but also to simulate an experience as close as possible to the reality of that period. Augmented reality utilizes real space to display additional information or to reproduce, through technology, certain sequences representative of that space, whereas virtual reality takes place exclusively in a virtual environment, through tools such as VR glasses and cameras. Also from a temporal perspective, the use of virtual and augmented reality technologies aims not only to recover elements of cultural heritage that have been lost in the mists of time, but also to preserve those that are still present to preserve their cultural heritage for centuries to come. In "The Key Role of VR in Preserving Cultural Heritage", (Leslie, 2022), the author discusses the key role that modern technologies play in preserving cultural heritage, especially in situations such as Ukraine, Syria or Iraq, where it is threatened with destruction due to war, and how, through modern VR and AR technologies, we have the chance to save, if not the physical cultural heritage, at least its memory by encapsulating it in other technologies. By capturing cultural heritage with innovative technologies, there is a chance to preserve it and leave it as a legacy to future generations, as well as the opportunity to rebuild heritage in times of peace. One such initiative is the Institute of Digital Archaeology - a project of Harvard and Oxford Universities in partnership with Dubai's Museum of the Future - which has recreated a Roman triumphal arch from Palmyra, destroyed in the Syrian war, in 3D based on archaeological evidence and

photographs taken by tourists. Once replicated in virtual reality, the Institute's robots were able to create a physical replica based on the digital model. The arch has since been exhibited in several locations around the world, as a testament to digital art in the contemporary world, but also as a proof of technology's ability to save cultural heritage and pass it on in diverse and creative ways.

4. The paradox of authenticity

This cultural approach is not without its critics, who argue that the greatest risk to cultural heritage in reproducing the past through virtual reality is the loss of authoritative authenticity (Zhao, 2021). In theory, virtual reality is supposed to fully mimic the target heritage object(s) using high-fidelity technology to preserve the authenticity of the cultural experience. If this could be put into practice, it would result in an identical user experience in both contexts (real and virtual). However, this is not possible. The virtual experience is not limited to simulating the real user experience. Through the virtual experience, reality is redefined and reinterpreted each time.

The paradox of authenticity in virtual heritage is that there is no consensus on what is truly authentic. As a result, two different schools of thought emerge when it comes to the authenticity of virtual heritage. The first promotes the idea that virtual heritage is authentic if it accurately reproduces the original object down to the smallest detail, without trying to enhance the user experience (Roussou, 2002). This is the direction most archaeologists, historians and museographers take, as it has proven to be the most relevant to heritage conservation. The second direction aims at authenticity from the perspective of creating something new from the existing cultural heritage, adapting it to the current needs of users and 'revitalising' access to cultural heritage. Visual experience is more important than historical and archaeological accuracy. This vision is shared by artists, media technicians and owners of cultural tourist attractions. For them, the use of cultural heritage for economic purposes seems to be more important than historical accuracy, and newly created elements are not perceived as lifeless replicas of the old, but as new, original elements that describe culture in an innovative way.

From a spatial perspective, the use of virtual and augmented reality technologies aims to bring cultural heritage closer to the viewer. If, in the above context, virtual reality recreates something that once existed and now only exists in archaeological finds, images or historical

books, in the current context virtual reality seeks to remove another barrier between the heritage object and the viewer/user: space. The barriers related to the spatial element can be multiple, both in terms of the culture consumer (economic, time, mobility, etc.) and in terms of the cultural element itself (state of degradation, reduced accessibility, access restrictions imposed by authorities, etc.). Virtual reproductions of heritage elements remove many of these barriers, providing the ideal context for the beneficiary to access the heritage element(s) and eliminating the implications of the resulting restrictions, as well as those related to the element itself.

However, the space of virtual reality is far from neutral, especially because of the artistic vision of the heritage element. Most virtual representations of heritage items follow the model of three-dimensional reconstruction of that object, based on the specific Cartesian coordinates of three mutually perpendicular axes. Although the model is inspired by Descartes' philosophy, it only emphasises one of the two terms representative of this philosophy - *res extensa* - namely the material aspects that occupy space in the physical world we know and understand. What is missing from this approach is what actually defines culture, namely the second fundamental element of Descartes' philosophy - *res cognitans* - the intangible, non-material elements of humanity, such as consciousness and subjective experience of time and space. Apart from the generally accepted mathematical perspective, the idea of 'space' has different connotations and interpretations from one culture to another. Indian culture, for example, has more than one concept that described by the term 'space', unlike Romanian or English. In Sanskrit, the same word, *akasa*, is used to define mental space, consciousness, and physical space. This is also the case in Japanese culture.

In other words, the virtual recreation of heritage elements using AR and VR technologies has the ability to represent only one of the many facets of the spatial dimension, depending on the artistic vision of the people behind the technology.

5. **Sustainability in heritage and the premise for a new theoretical framework: eco-sufficiency**

The use of digital technologies to recreate and enhance the cultural experience was a natural response to the need to protect and preserve cultural heritage. The degradation of cultural tourism objectives, the exposure of heritage paintings and sculptures to inappropriate light and

temperature, the constant contact of heritage elements with large numbers of people, the destruction of heritage in conflict areas, the excessive tourism associated with excessive commercialisation, but also the lack of awareness of the importance of heritage, are some of the reasons why there is a consensus among heritage professionals about the lack of sustainability in heritage tourism (Ashworth, 2009). There is an interconnected relationship between cultural heritage and the environment. The negative impact of cultural heritage on the environment affects the former to the same extent as the latter. The same applies to the negative impact of the environment on cultural heritage. A relevant example could be the following: heritage sites are exposed to natural conditions, such as very high or very low temperatures, humidity, air pressure or specific soil characteristics, which result in the natural degradation of building materials over time. Degradation processes cause the chemical, physical and biological compounds from which buildings are constructed to break down and become embedded in the soil layers, perpetuating the degradation process (Pedersoli, 2016).

Fortunately, technological advancements are making it possible to digitise heritage tourism and access to heritage sites. Photogrammetry and imaging technologies, combined with digital data processing and post-processing, make it possible to exploit heritage features for economic purposes (tourism) as well as for further scientific research and historic preservation. The use of immersive technologies allows access to cultural heritage not only for tourists but also for specialists. Digital heritage (as heritage exploited through virtual and augmented reality and other similar technologies is called in the literature) can be defined as one of the most important resources for the field of knowledge, as it contains cultural, scientific, technical, architectural, and other data created from elements of historical value.

The most representative example of digital heritage is the Google Arts&Culture collection, which at the time of writing includes over 1,200 museums and art galleries world (Hajirasouli et al., 2021).

Among the largest movements in the field of sustainable development, environmental protection and the circular economy, and first among them, is the Club of Rome. It was formed in 1968 by distinguished personalities, famous in the fields of science, politics, culture and business, who realised that climate change, the problems facing the environment, resources and population are the consequences of irresponsible use of resources. It was the creators of the Club

who came up with the idea of "limits to growth", which they and experts from MIT (Massachusetts Institute of Technology) documented and analysed from economic, biological, sociological, anthropological and technological perspectives, and put all these ideas into what is now considered the "Bible" of the sustainable development field, "The Limits to Growth", which promotes the idea that our resources are finite, so that infinite economic expansion is not realistic or sustainable. The book outlines the predicament facing humanity in terms of growth based on depleting resources and excessive consumerism and provides an overview of the drivers of this unsustainable growth, as well as alternative measures that can be taken to create "a global steady state".

The term "sustainability" has emerged as a ubiquitous discourse in contemporary literature. While there are divergent perspectives on the precise origins and initial instances of its utilization, there is a prevailing consensus that the conceptualization of sustainability does not predate approximately five decades. Today, the concept of sustainability has permeated every aspect of life, both in everyday life and in specialised areas. According to the Brundtland Commission, sustainable development defines the level of development which meets the needs of the present, while making sure the future needs of the generations to come are still being able to me met. In the context of cultural heritage, it denotes the responsibility to protect and preserve cultural heritage, considering all the ethical, social, economic, and environmental aspects involved in the process.

In response to the ethical dilemma regarding the sustainability of using innovative virtual and augmented reality technologies to preserve and promote cultural heritage, experts have laid the theoretical foundations for a new concept: the eco-sufficiency perspective (Paschalidou, Fafet and Milios, 2022). It is based on the premise that the best way to preserve cultural heritage is through digitisation. In order to minimise the negative impact of the digitisation process on the environment, it is necessary to create a new conceptual framework that integrates elements of sustainability into the sphere of development of innovative virtual heritage technologies. Eco-sufficiency aims to strike a balance between efficiency and sufficiency, balancing the positive impact of developing a new technology for heritage use and preservation with the negative impact of the same technology on the environment.

Although still at an early stage, the new concept has the potential to revolutionise the relationship between sustainability and cultural heritage by involving policy makers and international heritage organisations in the development of the measurement tools needed for such benchmarking.

6. Conclusions

Heritage plays an important role not only in the creation and implementation of socio-economic development strategies, but also when it comes to sustainable development. The environmental issues facing society have been a central focus of all soft-power policies over the last 30 years, and their integration into all socio-economic aspects is no longer new. The European Union is increasingly focusing attention on the impact of cultural heritage on sustainable development, initiating a series of cultural funding projects with a key objective: "the first climate neutral continent". (The European Commission, 2022). The shift from traditional economic perspectives (pertaining to cultural economics) to a framework dedicated entirely to cultural heritage shows a growing recognition for the need a specializes approach in the field. But it also brings a wave of divergent opinions in the literature, between the voices promoting the preservation of cultural heritage and criticizing the economic utilization of it, and those claiming that economic utilization, done properly, is the key to cultural heritage protection and conservation.

In support of the latter, virtual reality and augmented reality offer the best means to both explore cultural heritage from an economic perspective, and contribute to the preservation of it, providing tools for safe and non-damaging utilization of culture and cultural sites. But these advanced technology tools have their own limitations: big costs, limited attribution, and issues regarding authenticity. Is a virtual and augmented representation of an antic art piece an ideal copy of it or a reinterpretation with its own cultural value? This is a question that finds its answers differently, depending on the conceptual framework we analyse. The paradox lies in the challenge of defining the concept of authenticity in the virtual world, where the users experience, differently from the real world, can be constantly and continuously redefined and reinterpreted.

In the pursuit of a new theoretical framework to define and understand the challenges of promoting and protecting cultural heritage in a world focused on growing and expanding beyond

its means, the concept of eco-sufficiency proves it is possible to integrate the principles of environmental sustainability and protection in the process of preservation of cultural heritage. While still in early stages, the framework provides enough evidence to support a strong potential collaboration between environmental and cultural heritage management with the purpose of developing strategies and taking measures to enhance digital endeavours towards sustainable development and protection.

This paper proves a dynamic interplay between economic perspectives, technology advancements and sustainability concerns in the realm of cultural heritage protection. The multidisciplinary nature of this research contributes to a deeper understanding of the complex connections between cultural heritage, economics, technology and sustainability. Future endeavours in the subject must analyse the evolution of eco-sufficiency and its potential to sustain a new framework for risk management in cultural heritage protection.

With regards to the limitations of the research, one of the most challenging aspects was to integrate the economic perspective with other fields pertaining to cultural heritage, such as sociology, anthropology, and archaeology, while fully accounting for the policy framework in the cultural domain, at national and international levels.

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