

Article

Considering Urban Development Paths and Processes on Account of Adaptive Reuse Projects

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Abstract: This article, as part of the ‘SUMcity’ research program, aims to give a comprehensive account of the regeneration that occurred in Athens by the adaptive reuse of the old FIX Brewery to house the new Hellenic National Museum of Contemporary Art (EMST). Adaptive reuse is an urban sustainability development evolving process, used to manage assets and resources efficiently, resulting in economic development, increased local attraction, and revitalized community engagement. Other than that, modern societies experience the dynamic stream of social media and smart city initiatives, amid a long-discussed and complex cultural heritage preservation backdrop. Notwithstanding the value added to the city, the interaction of sustainable development with adaptive reuse projects, culture, tourism, social media use, and smart city initiatives, along with the impact of this intangible relationship, has yet to be set in a more tangible form. Methodologically, a newly developed conceptual framework is used in order to re-define the (cor)relations among the existent concepts of sustainable development, smart city and cultural heritage. Subsequently, a primary questionnaire-based research is conducted on Instagram users’ geotagging the Hellenic National Museum of Contemporary Art (EMST), analyzing their views in an attempt to demonstrate the arising local potential and sustainability.

Keywords: adaptive reuse; urban regeneration; sustainable urban development; cultural heritage; smart city

1. Introduction

The recognition of (smart) city residents as equally important to culture in formulating sustainable urban development is now widely understood. In connection with the accelerated development of cities, the demand for solutions meeting the sustainability challenges has magnified. This fact has led researchers to focus on issues related to the circular economy model, aiming to ensure the continuity of goods, services, and infrastructure [1].

Historically, the need to preserve and protect the environment, and, accordingly, architectural works, emerged in the 19th century [2], mostly driven by the human desire to protect the natural and built environment, which were threatened by the destructive tendencies of the rising industrial capitalism [3]. Since appropriate urban development does not exclusively include economic initiatives and plans, in terms of enhancing the social fabric and thus sustainable development, in this context,

there are many examples of long-term urban sustainable development strategic plans, aspiring towards the regeneration of the urban fabric [4], involving until-recently abandoned historical buildings [5].

The intangible value of culture is, in monetary terms, unmeasurable, but the fact that historic buildings add value to a place is commonly acknowledged by scholars [6]. Adaptive reuse is considered to be an important cultural heritage conservation strategy [7], with various socio-economic and environmental overtones [8]. Adaptive reuse—a real-world practical toolkit often proved to be better than demolition and reconstruction [9]—enables people to see heritage sites as an opportunity. Since the cultural heritage buildings are rooted into the city's identity as (mostly) part of the urban landscape, adaptive reuse can strengthen the community's sense of belonging by positively linking the city's past with the future, offering, at the same time, some of the most astonishing buildings to be used for the emerging city needs, a process which can, overall, spark wholesome urban renewal processes [10]. In other words, adaptive reuse is a process whereby new content is introduced into an existing building, a process that presents an interesting opportunity for the Internet of Cultural Things and its applications, in terms of adapting a new use into the original construction [11].

At the same time, the ever-increasing reach of social media, as well as smart city initiatives [12], are considered catalysts towards building a healthy community through cooperative co-existence and social action. Therefore, the various online sources and tools, along with the development of the mass data they generate, are considered to be an integral part of the new modern, digital era, and indeed provide enormous social dynamics [13]. They are used, intentionally and unintentionally, as a means of mobilizing communities, by defining specific city locations (GeoTagg) as places that provide an encouraging socially unifying channel for community involvement. Therefore, social media and smart cities initiatives, working as Internet of Cultural Things (IoCT) are of great importance in enabling current and future generations to reconsider their cultural heritage in terms of sustainability [11]. Besides, computing has already become an integral part of the urban built environment, causing it to become adaptive [14].

Given that cultural heritage applications are currently becoming extremely popular in smart city environments [15], and in order to ensure greater sustainability, emphasis should be placed on the challenges and opportunities arising from using the modern means available to preserve culture as well as to revitalize cities into smart hubs [16], that is, cities in which information technology is linked together with urban structures, city operations, services, and people in order to tackle economic, social and environmental challenges [17]. After all, the current digital shift in design [18] is shaped by dialogues between behavioral data from real-time users and the reaction of the architectural space [19], such as, in some ways, happens in adaptive reuse [20]. Hence, technology establishes a digital connection between the behavior of people and their surrounding built environment. IoCT, as means to further understand and use the data-rich culture, suggests that visitors are points of a network, revealing—in a hypothetical visualization attempt—cultural heritage institutions as material data relations [21]. Therefore, public understanding and engagement (participatory and interactive) with digital cultural data is considered to be particularly important. This mainly occurs when adopting a view on the newfangled loss of the traditional urban morphology and sense of a place debate [22], wanting citizens to retain their desire to protect their cultural identity [23].

Against this background, the focus of the present work is on the adaptive reuse of cultural heritage, making way for continuous and evolving sustainable cities, enabled by the IoCT and its applications.

2. A Multilevel Conceptual Model for Local Sustainable Development

Our Common Future, also referenced as the Brundtland Report of the World Commission on Environment and Development, published in 1987 by the United Nations, first introduced the term sustainable development. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs, within the meaning of a time-framed holistic approach that will lead humanity to reach the final status of sustainability. Sustainability is understood as an anticipatory and socially responsible decision-making process, with

synergies intended to avoid and reduce the negative effects and preserve the balance among ecological resilience, economic welfare, socio-political justice, and cultural efflorescence so as to assure a desirable planet for all its inhabitants at present and in the future [24]. Sustainability, considered as the ultimate objective of the human versus ecosystem equilibrium, questioned or not [25], may also be read as a socio-ecological process reflecting a universally shared ideal pursuit [26].

Twenty years later, during the largest gathering of world leaders in history, in the once-in-a-generation opportunity of the 2005 World Summit, the sustainable development goals were identified, consisting of three fundamental principles: economic development, social development and environmental protection [27]. A theory, or preferably an approach, that sees these three pillars of sustainability as interdependent and mutually supportive and which provides a foundation for countless sustainability theories [28], quality systems, etc. In addition, sustainability is an invitation to act on a constantly ongoing task, and thereby can also be seen as a socio-political process with (pre-)defined values [29], or a dialogue of values [30] that challenge the sociology of development.

While the United Nations report specified sustainable development using the triple bottom line model, somewhat recently, a different approach, namely the Circles of Sustainability, pointed out four dimensions [31]. This view towards addressing seemingly insoluble global problems (see climate change, globalization, urbanization, and social change [32]), based on an indicators' system [33], considers economy, ecology, politics and culture as social domains (perhaps a dimension of the 'engaged theory' [34]) differentiating the environment as something beyond people's ken [31]. Circles of Sustainability as a sustainability assessment tool is widely used for making cities and urban settlements more sustainable, resilient, adaptable and thus more livable (www.circlesofsustainability.org).

In this context of the perennial quest for balanced development, [35] developed a dynamic edged complex theory of the urban locus of sustainability principles and policies. However, as recently stated [36], this view incrementally enhances the social sustainability aspect, perhaps in an attempt to shift the doctrine, or focus, from economic development.

Similarly, [37] developed the Planning Hexagon, a lesser-known sustainability model rendering relations among economy, environment, societal culture, personal beliefs, technical/administrative skills, and legal, political and planning systems. Although it is argued [38] to belong to the integrational perspective, and that it compartmentalizes the relationships, resulting in scale issues drawbacks; highly anthropocentric, lacking conceptual coherence, interconnectedness among the aspects, completeness, and transdisciplinarity. Instead, [38], taking a step towards the Natural Step Framework [39], the time dimension is introduced, proposing the Two Tiered Sustainability Equilibria, in which the three main pillars of sustainability interact with each other through time.

Urban sustainability, in quantitative as well as qualitative terms, is constantly evolving and involves all the different sustainability dimensions, as well as their various combinations. Indicators, benchmarks, audits, standards, indexes, certification and reporting systems, as well as assessment, in addition to the political pragmatism debate and the sociology theories, are applied over a wide range of spatial and temporal scales. However, the more complex the problems, the less useful the current sustainability assessment tools seem to be for understanding and assessing different domains.

Thus, given the complexity of the sustainability assessment, which is constantly debated on the global agenda, the rationale behind the innovative conceptual framework of this study is clear. Utilizing a significant body of the foregoing theory and taking it a step further, a five-pillar conceptual framework is conceived, in order to demonstrate the interdependence and the interconnection of the Sustainable, the Cultural and the Smart city, viewed as a coherent whole concerning local development. This five-pillar conceptual framework attempts to move away from what currently defines and characterizes the sustainable city, along with the prevailing understanding of the three sustainability dimensions, which, as previously discussed, do not seem adequate to address the future city needs. Contrarily, it seeks to move on by means of setting out to create an international model of the sustainable, the cultural and the smart city, an engine of growth and innovation towards improving residents' living conditions, cultural development, and knowledge generation. Future cities should

be urban communities committed to improving the well-being of the current and future residents, integrating economic, environmental, social and cultural considerations. The inter-linkages among these considerations should be evident in cities that function as integrated urban systems. Innovative solutions in the urban landscape and the build environment should span multiple sectors, including buildings, energy, urban transport, water, and solid waste [40].

Building on the background of the existing theories, as mentioned above, this research introduces a quintuple bottom line matrix (5BL) of the sustainable, the cultural, and the smart city. Using the five-set Venn diagram with congruent ellipses in a radially symmetrical arrangement devised by [41], as illustrated in Figure 1 it is suggested that a city's long-term balanced coordination can only be achieved through treating all five inter-required aspects in a simultaneous and parity-based fashion. These five aspects of the sustainable, the cultural and the smart city are: (a) economic sustainability, (b) environmental sustainability, (c) social sustainability, (d) culture, and (e) smart city initiatives.

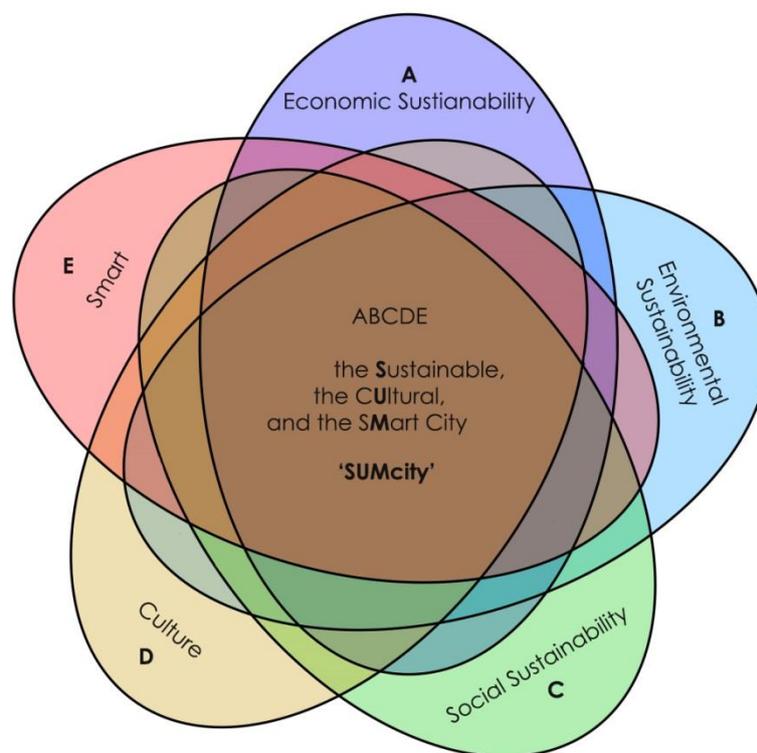


Figure 1. The quintuple bottom line matrix of the sustainable, the cultural, and the smart city.

3. Materials and Methods

The current research, following the innovative representation of the complex and dynamic equilibria of the sustainable, the cultural and the smart city, based on a literature review as previously described, proceeds by carrying out an exploratory case study approach, commonly considered to be appropriate for the study of contemporary phenomena [42]. Thus, using a questionnaire, research was conducted towards revealing whether adaptive reuse strategies, which are considered a perfect example of the sustainability principles application [43], practiced on buildings of particular cultural significance, combined with smart city initiatives, ultimately affect local development.

3.1. Case Study

In order to present a thorough and comprehensive understanding of the possible local development paths of the sustainable, the cultural and the smart city, this research takes an integrated research approach focusing on the transformation of the until recently dilapidated FIX Brewery to house

the newly established Hellenic National Museum of Contemporary Art (EMST) in Athens, Greece (hereinafter, in the interest of brevity, 'EMST' or 'the museum').

The FIX brewery company was founded in 1864 by Johann Karl Fix in Athens and shortly became one of the major breweries in Greece. In 1860, in the face of growing demand, the FIX Brewery moved its facilities to Andrea Syngrou Avenue in Koukaki, an Athenian southeastern district, with no clear signs of growth at the time. Around 100 years later, the FIX Brewery administration agreed to upgrade the industrial premises in order to meet the opportunities presented by industrial development and growth in Greece. The new premises were complete in 1961 (Figure 2). In an attempt to create a flexible industrial building that can be modified and adjusted to future industrial uses, architect Takis Zenetos and his colleague Margaritis Apostolidis embodied the principles of the modern architectural movement. The new industrial construction soon became a historic landmark of both modern architecture as well as Athens. However, just ten years later, FIX Brewery production was relocated far from the downtown area, and the iconic building became abandoned.



Figure 2. General view of the FIX Brewery façade on Sygrou Avenue just after Zenetos and Apostolidis' architectural intervention. Source: [44].

In 1994, the FIX building's northern part was demolished in order to facilitate the construction of the subway (Figure 3). Architects, urban planners, heritage conservators, and scholars have since heavily criticized this act [45].



Figure 3. March 1995; the excavator demolishing the northern part of the Zenetos and Apostolides iconic building. Source [46].

In 2014, the old FIX Brewery had been adaptively reused as the new house of the EMST (Figure 4), preceded by a significantly prolonged period of consideration, meetings and construction works. The reconstruction was held by 3SK Stylianidis Architects and K. Kontozoglou, I. Mouzakis and Associate Architects, and Tim Ronalds Architects.



Figure 4. Sygrou Avenue general view of the recently adaptively reused iconic FIX Brewery façade to permanently house the EMST (2020).

3.2. Survey

Primary questionnaire-based research was conducted, of Instagram users posting pictures geotagging the EMST. This population was selected primarily because it was critical for the study to question individuals that have verifiably paid a visit to the newly established museum. Unfortunately, while the research was ongoing, the museum was not operating due to permanent exhibition installation works. In addition, it was important for the current research to establish an understanding of smartphone users and, in particular, their perspective with regard to smart technology and initiatives. The survey was about adaptive reuse, smart (city) initiatives, and matters associated with the local sustainable development, in an attempt to profile the possible local development paths of the sustainable, the cultural and the smart city. The questionnaire was first sent to the small sample in order to conduct a pilot study [47], leading to minor changes before the final distribution. The online questionnaire survey was conducted from April through July 2019, providing a database including replies from 110 respondents in total. It is worth noting that contacting Instagram users was quite challenging, given Instagram's built-in safety features, which do not allow mass mailshots. However short-numbered the sample, following [48,49] it could be considered representative of the population, id est individuals that have verifiably visited the EMST, and thus it can provide a good basis to study the hypothesis that was set out, that is visitors' views on the results derived from the urban scene from the FIX Brewery transformation.

4. Results

A total of 110 Instagram users participated in the online survey, including mostly Greeks, as well as tourists. The percentage of women responding was higher (54.1%) than that of men, providing an average of 31 years of age (min 18; max 62; median 34.5). Regarding educational level, the majority of the respondents are university (post)graduates (72.8%). Thus, the sample is mostly comprised of the young and highly educated, a finding which is consistent with the representativeness in online surveys [50]. Regarding respondents' occupation, 68.8% were working when the survey was conducted (employees, self-employed, and civil servants), while, of the remaining, 24.8% were students and 4.6% were unemployed (Figure 5). As for their personal monthly income, respondents reported having an average monthly personal income of €604 (min 100; max 5000; median 950). The respondents' profile analysis is consistent with the wider literature and official statistics as well as the economic reality in Athens [50,51].

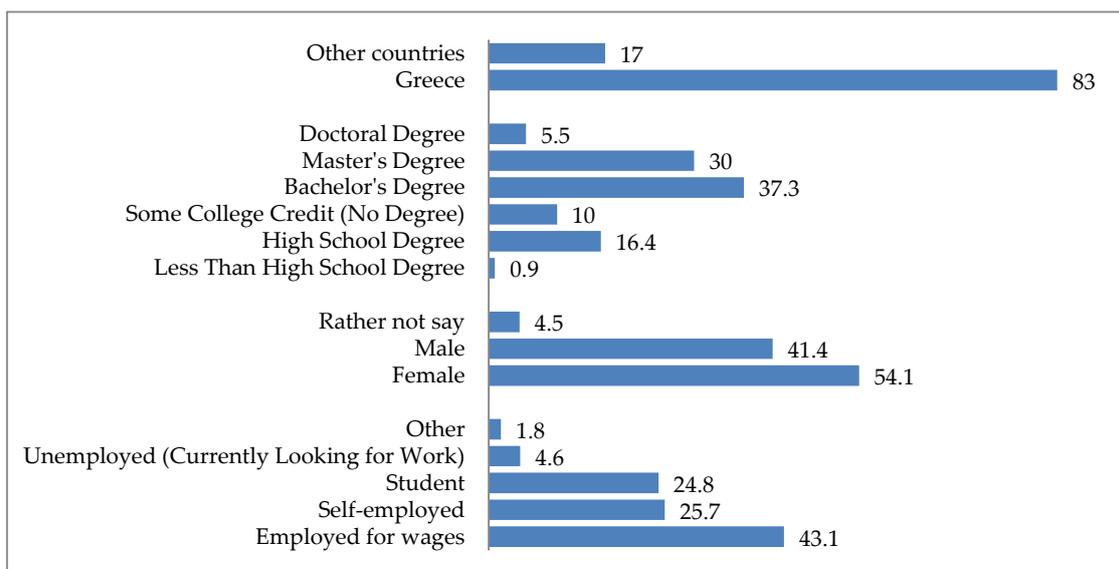


Figure 5. Demographics (%).

The Instagram users were asked both about the EMST and the surrounding area. Besides the questions regarding the socio-economic characteristics of the respondents, the questionnaire focused

on three main issues: (a) the museum; impressions regarding the visit, familiarity with the building history, reasons for visit, means of transportation, before and after leisure, etc., (b) views regarding the adaptive reuse itself, and (c) perceptions and experiences with social media and smart city initiatives.

To begin with, almost all of the respondents consider that museums in Greece are touristic attractions (Figure 6).

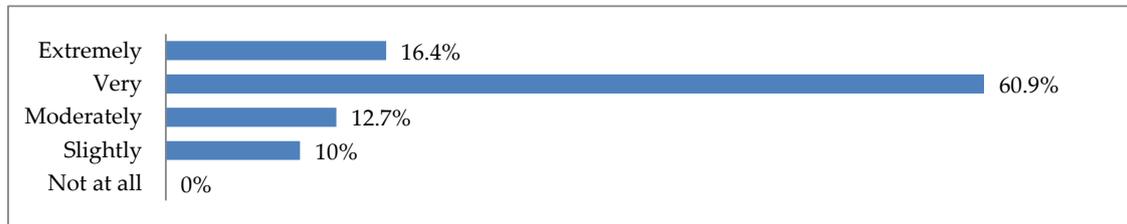


Figure 6. To what extent do you consider that museums in Greece are tourist attractions?

Most of the Instagram users reported that their visit at EMST was in order to visit a periodic exhibition or a permanent exhibition, or even to attend an event hosted at the museum premises, however, several also reported that the purpose of their visit was to see the FIX building housing the museum, from an architectural point of view (Figure 7).

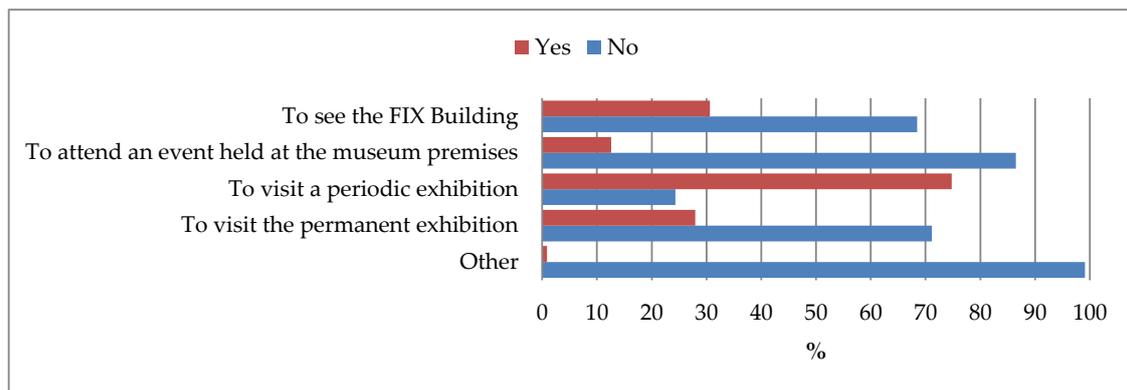


Figure 7. Reasons for visiting the EMST.

Quite naturally, in order to approach the museum, one will either have to use public transportation or a taxi or a private car. In either case, using a smart app when moving around a metropolitan area like Athens can often be an easier and a much quicker way [52]. However, although the majority of the respondents reported using public transportation (64.5%), at the same time they report somewhat weak impressions of public transportation smart apps. On the contrary, respondents report they would use a smart app intended to help them navigate towards their destination using their car, not being particularly concerned about finding a nearby parking lot; perhaps mainly due to the existence of an organized Metro parking facility at Syngrou-FIX station. A total of 90.5% report that they parked their vehicles at the organized Metro parking facility at Syngrou-FIX station (Figure 8).

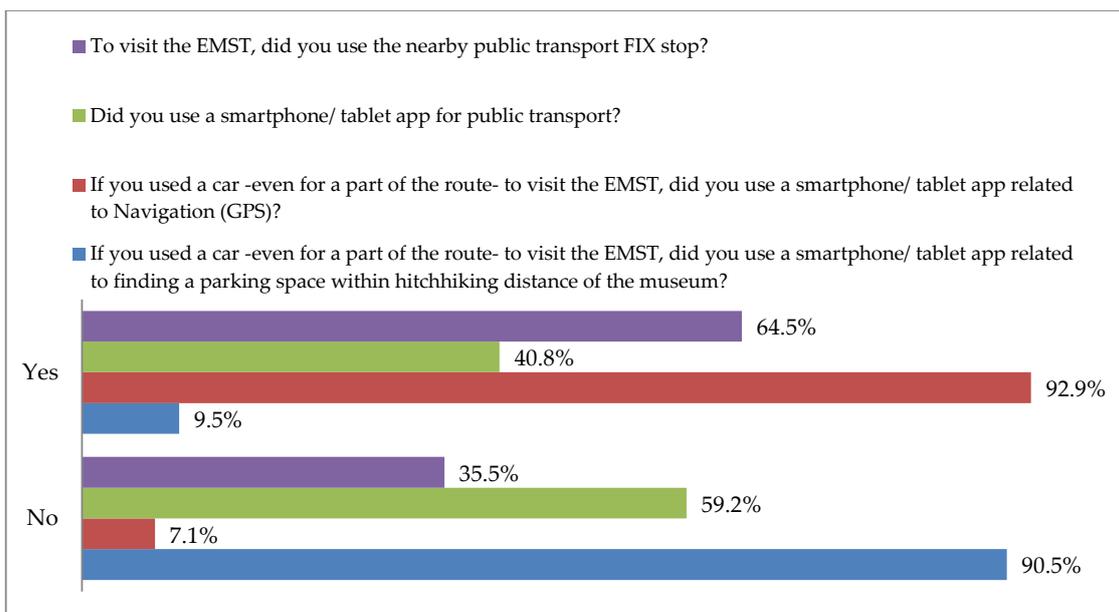


Figure 8. Means of (smart) transportation.

A significant percentage of museum visitors reported that they combined their visit with a visit to another cultural recreational area nearby. Money-wise, this translates into an average expenditure of approximately €19 per person for leisure before and/or after visiting the EMST (Figure 9).

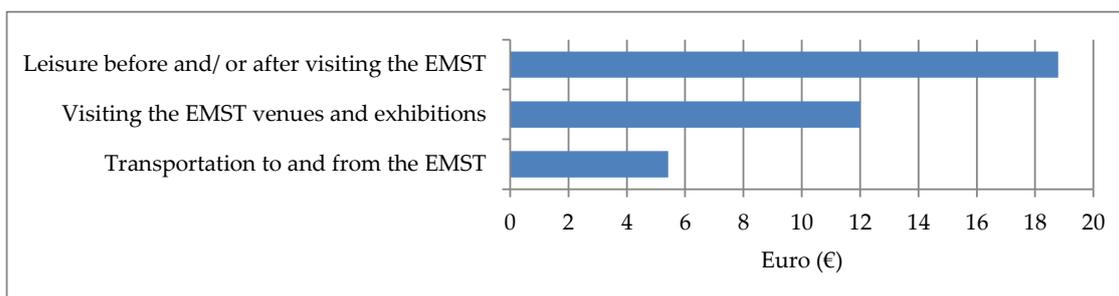


Figure 9. Money spent during the visit to the EMST.

Overall, respondents were quite satisfied with their visit to the EMST, while they seemed to believe that they are familiar with the history surrounding the FIX building (Figure 10). In particular, female respondents report greater satisfaction (71.6%) with their visit to the museum compared with male respondents (65.2%), as well as a higher degree of knowledge and understanding of the FIX building history than men (37%). In addition, a considerable number of respondents (34.5%) state that the adaptive reuse of the FIX building is, to a great degree, environmentally friendly (Figure 10).

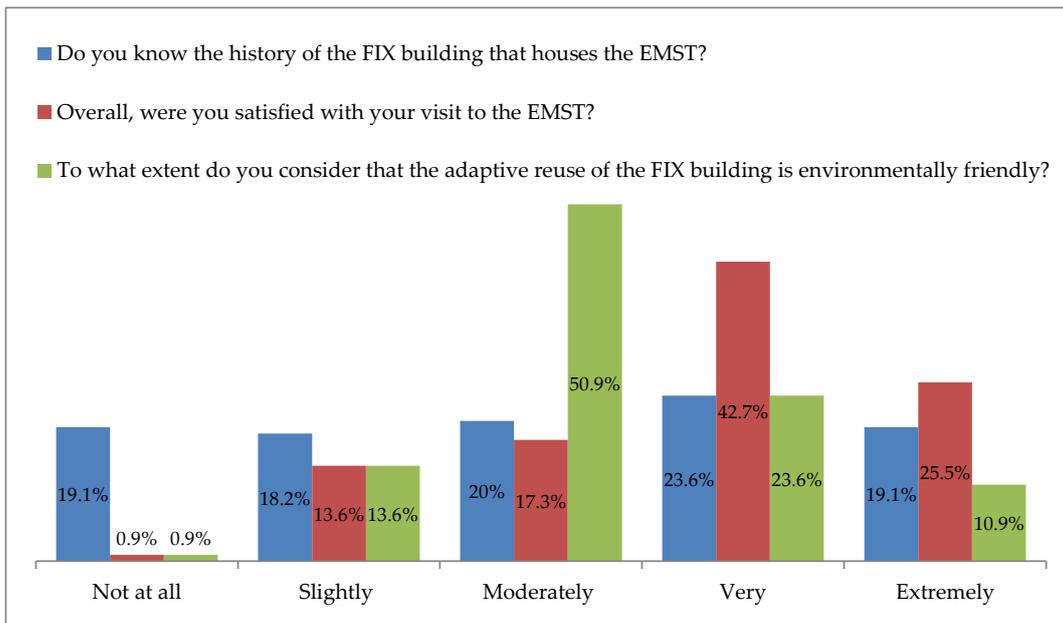


Figure 10. EMST visitors’ reviews regarding (Red) their visit experience; (Blue) their beliefs regarding their understanding of the history of the FIX building; (Green) extent to which they consider that the adaptive reuse of the FIX building is environmentally friendly.

As follows from the interviewees’ answers, the FIX building retrofit is not misconceived, but, rather, the local identity and memory are protected and enhanced by adaptively reusing the FIX building to house the EMST, while social cohesion and involvement are ensured (Figure 11).

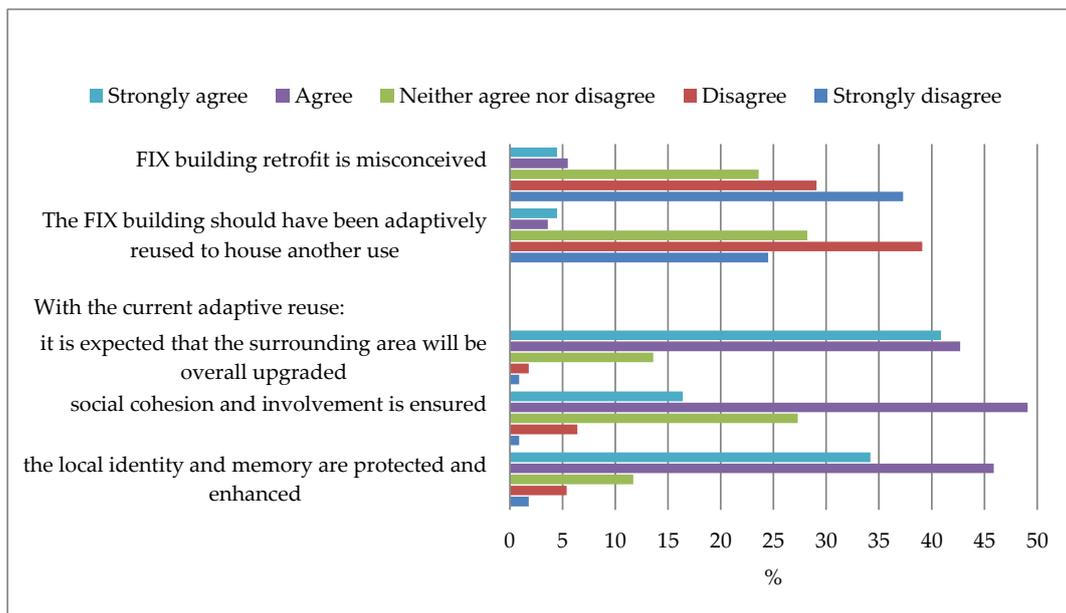


Figure 11. EMST visitors’ perceptions regarding the FIX Brewery adaptive reuse project.

Furthermore, respondents report that the adaptive reuse of the FIX building to house the EMST contributes to the development of cultural and social life and the improvement in the quality of life of the nearby residents, as well as ensuring market expansion and competitiveness (Figure 12). However, Instagram users do not support that the adaptive reuse of the FIX building to house the EMST contributes to the creation of new small and medium-sized enterprises in the nearby surrounding area, or that it contributes to the reduction in unemployment.

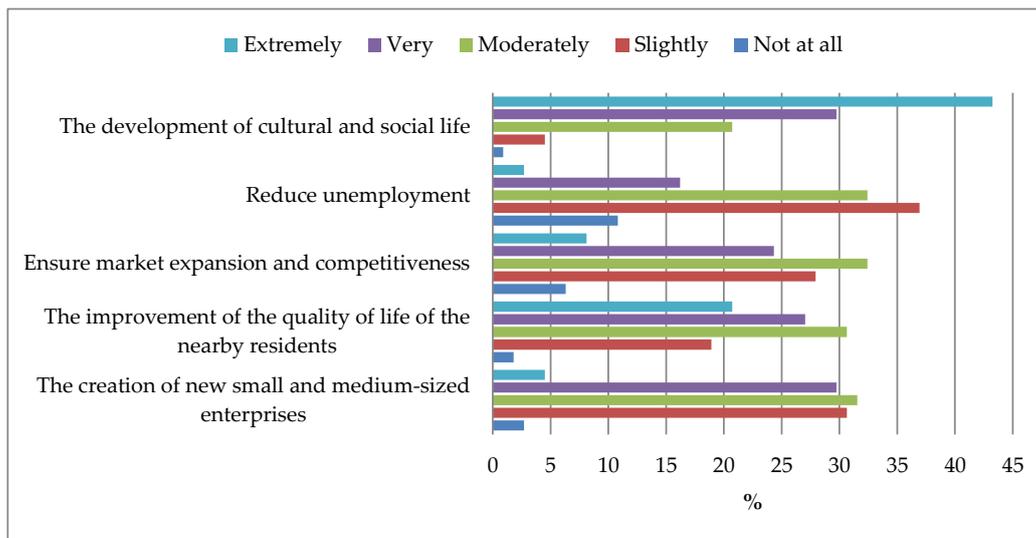


Figure 12. What do visitors consider and to what extent the adaptive reuse of the FIX building to house the EMST contributes to other factors.

The following questions were about new and smart technologies and their applications. Of course, the Instagram users were quite familiar with new and smart technologies and applications (50% and 33.6% report being extremely and very familiar, respectively). Furthermore, 91.8% highly support that social media can also serve as a source of information. Their activity on social media seems to be quite intense, as they use it at least twice a day (82%) or more. Respondents appear to frequently post photographs on their social media; however, the majority were not following the museum’s Instagram account. However, the fact that the respondents (92.7%) report that the existence of a museum smart app as being a factor that could affect their choice to visit the museum is extremely important. In particular, respondents state that such a museum smart app would keep them up to date about the future activities of the museum, and it would allow them to study the exhibits and the museum itself before, after, and even during, their visit (Figure 13).

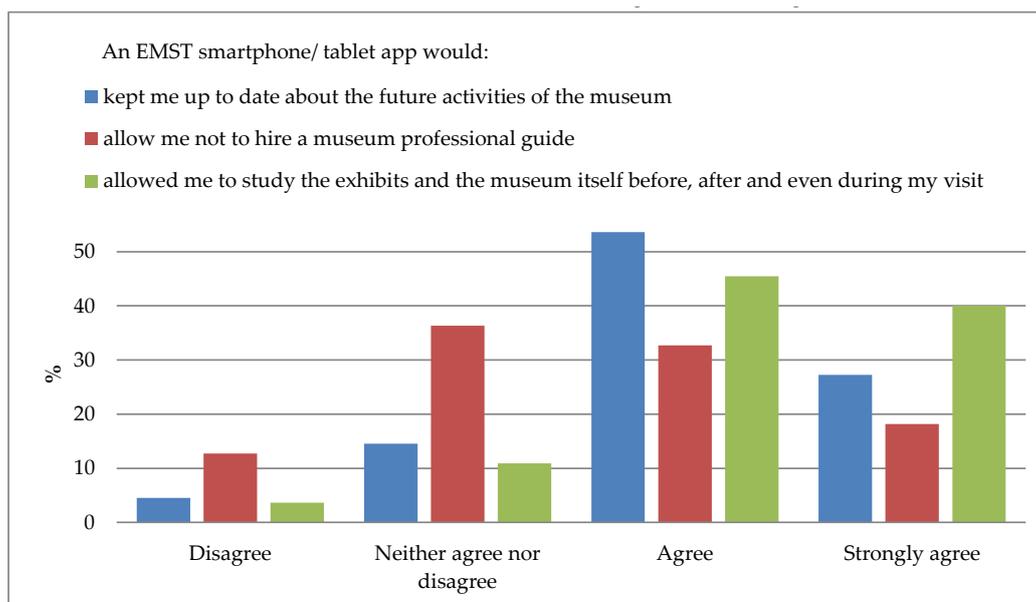


Figure 13. Respondents’ considerations regarding the usefulness of a museum smart app.

Finally, it is worth noting that one of the main reported reasons the respondents posted a geotagged photograph on Instagram from their visit to the EMST is out of architectural interest, followed by willingness to promote the museum, its collection or a specific artifact (Figure 14).

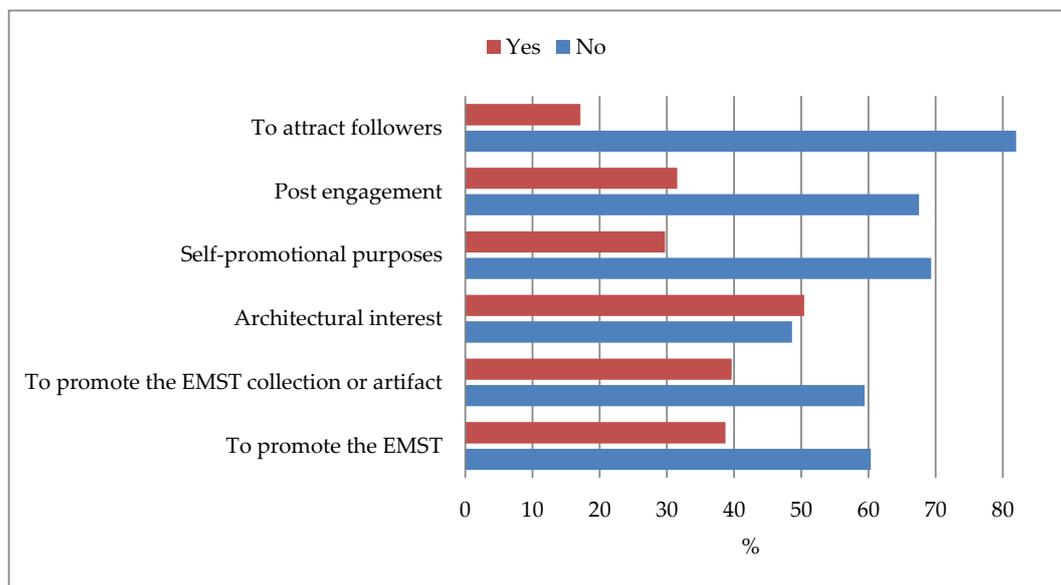


Figure 14. Visitors' reasons for posting a geotagged photo taken from their visit at the EMST on Instagram.

5. Conclusions

In an attempt to test and study the newly introduced quintuple bottom line matrix (5BL) of the sustainable, the cultural, and the smart city, this research uses the case of the adaptive reuse of the iconic historical building FIX Brewery to house the EMST. Seen as a prime example of an evolving cultural heritage conservation process applying the principles of economic, environmental, and social sustainability, and used in order to manage mainly cultural heritage assets and resources efficiently, the interaction with social media use, and smart city initiatives are examined.

The results presented above, consistent with the wider literature [1], clearly support that the FIX Brewery building's adaptive reuse to house the EMST has a positive impact on the overall surrounding local development, especially when combined with technology, resulting in economic development, increased local attraction, and revitalized community engagement. Besides, technological development through smart initiatives can provide a city with the necessary impetus to maximize its potential and achieve sustainability [53]. The paper concludes by outlining that adaptive reuse projects can revitalize the surrounding area, have a positive influence on the local community, and are likely to increase quality of life and per capita income, and reduce unemployment status by promoting certain aspects of the city culture, turning it, in addition, into a tourist attraction [54]. The results are promising and should encourage the EMST administration to take appropriate actions towards enabling the museum to be a fundamental part of the city's identity through the use of current digital era technological tools [55]. More broadly, findings from the current research could be valuable to decision-makers and involved stakeholders aiming to achieve successful sustainable urban development. Although the majority of the findings presented in this paper derive from empirical research based on the specific case study in the context of the quintuple matrix of the sustainable, the cultural, and the smart city, the implemented methodology could be applied to a broader context, hence leading to more universal observations.

Author Contributions: I.V. devised the project, the main conceptual ideas and proof outline, developed the theoretical framework and took the lead in writing the manuscript with input from all authors. I.V. was involved in conceiving and planning the empirical study with help from C.S., P.G. and E.P. I.V. also processed the data,

performed the analysis, and derived figures and models with help from C.S., and in consultation with G.C. and C.M. E.P. supervised the work and the findings of this work and was in charge of the overall direction. C.M. and E.P. also verified the analytical methods. G.C. and C.M. were tasked with diffusing the research progress and results by means of software on the internet (<http://sumcity.hua.gr>). I.V. revised the manuscript during the peer-review process. All authors contributed to the interpretation of the results and provided critical feedback that helped shape the research, analysis, and the published version of the manuscript. All authors have read and agreed to the published version of the manuscript.

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