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Arfa, F.; Lubelli, B.; Zijlstra, H.; Quist, W.J.

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Review

Criteria of “Effectiveness” and Related Aspects in Adaptive Reuse Projects of Heritage Buildings

Fatemeh Hedieh Arfa ^{*}, Barbara Lubelli, Hielkje Zijlstra and Wido Quist 

Section of Heritage and Architecture, Department of Architectural Engineering and Technology,
Faculty of Architecture and the Built Environment, Delft University of Technology, Julianalaan 134,
2628 BL Delft, The Netherlands; B.Lubelli@tudelft.nl (B.L.); H.Zijlstra@tudelft.nl (H.Z.);
W.J.Quist@tudelft.nl (W.Q.)

* Correspondence: F.Arfa@tudelft.nl

Abstract: Adaptive reuse (AR) of heritage buildings is a complex process due to the involvement of many actions and actors, which influence the results of the projects. The effectiveness of AR projects can be described by various criteria. This paper aims to provide a comprehensive overview of the criteria of effectiveness in AR projects with the final scope to guide and improve the AR process. A review of the jury reports of two highly prestigious awards in the Netherlands (NRP Golden Phoenix award) and Europe (Europa Nostra) has been conducted. In total, the reports of 48 cases have been reviewed. The five criteria mentioned in the regulations of the NRP award have been used to categorize the aspects mentioned in the jury reports of both awards. These criteria are: “social value creation”, “sublimation (both architectural and cultural aspects)”, “environmental sustainability”, “economic value creation”, and “innovation”. This review reveals that “social value creation” and “sublimation” are among the most highlighted criteria that the juries considered for the effectiveness of AR projects. Often aspects mentioned for these criteria overlap partially with those aspects mentioned in the criterion of “economic value creation”. This indicates that enhancement of the qualities of heritage buildings and their surroundings and improvement of the social values and the resulting positive economic effects are strictly interrelated. The overview of the criteria of effectiveness, as defined in this work, will serve as a basis for the investigation of the tools and methods which can be used in the AR process to achieve these criteria.

Keywords: adaptive reuse; effectiveness; heritage buildings; built environment; sustainable development



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1. Introduction

In today’s world, restoring and repairing existing and heritage buildings to be used again has become a prevalent and yet challenging action in the field of architecture and heritage [1–3]. The process of converting a building to a function which is significantly different from the original function is often described as “adaptive reuse”. This definition has been used throughout the current paper [4–6]. Adaptive reuse (AR) of heritage buildings is not a new phenomenon. Despite entry of the term “adaptive reuse” in the terminology of the conservation field only in the 1970s, AR has a long history [7]. This concept has also been known as “adaptation”, “rehabilitation”, “retrofitting”, “remodeling”, and so on [4,8], and many researchers have highlighted how the use of different terms for it can create confusion (e.g., [8–10]).

AR projects can bring many advantages for societies; for example, they can revitalize abandoned buildings and neglected areas and thus enhance the quality of life for local communities [11]. AR is a complex process [8], involving many actions and actors [12], which influence the results of the projects. Research has been done with the goal of improving this process. On one hand, researchers have investigated the “success factors” (e.g., social,

economic, environmental, governmental, etc.) influencing the AR process and contributing to reaching an effective result (e.g., [10,13,14]). On the other hand, researchers have studied the criteria based on which an executed AR project can be defined as effective. In [15], sustainability is highlighted as a criterion of effectiveness and the different dimensions of it (including social, environmental, economic) showing the achievement of sustainability are identified and described. In contrast, in other publications, such as [16], the focus is laid on one single dimension of sustainability, either social, environmental, or economic.

Despite the existence of several scientific publications on the criteria of effectiveness in AR projects, these do not provide a comprehensive overview of the criteria (and of the specific aspects of each criterion) based on which an AR can be described as effective. For example, Bosone et al. [17] proposed valuable criteria for the ex-post evaluation of AR of heritage buildings; however, these are assessed only from the perspective of the circular economy, whereas criteria related to architectural qualities are mostly missing.

This research aims to provide an overview of the criteria, and specific aspects for each criterion, which have been used in describing the effectiveness of the adaptive reuse of heritage buildings. The identified criteria and aspects can then be used to guide the AR process towards an effective result.

Jury reports of winning AR projects in a selection of Dutch (NRP Golden Phoenix (“Het Nationaal Renovatie Platform Gulden Feniks” in Dutch)) and European (Europa Nostra) awards have been reviewed; criteria have been identified, and for each criterion, aspects showing that a criterion has been achieved have been distilled.

The starting point of this research is the Dutch context. The Netherlands is one of the prominent countries for AR in Europe [18]. In the Netherlands, reuse of heritage and existing buildings is a usual practice, especially after the financial crisis in 2008; AR is directly connected with solving the problem of vacancy [19]. The most relevant award for AR projects is the “Golden Phoenix”. This award was set up in 2011 by the Nationale Restauratie Platform (NRP), a Dutch organization initiated in 2008 with the scope of guiding different groups of stakeholders in the AR process of existing buildings. Recent AR projects can be submitted yearly to this award. A group of experts in different domains of architecture visit the projects and select the winners [20]. The jury reports as well as the criteria used by the jury for the assessment are published online. These documents are considered to provide, for the Dutch context, the most comprehensive overview of criteria based on which an executed AR project is judged as effective. Because of this reason, this paper is structured according to the five criteria mentioned in the regulations of the NRP award [21,22]:

1. Social value creation;
2. Sublimation;
3. Environmental sustainability;
4. Economic value creation;
5. Innovation.

2. Materials and Methods

This paper is based on a comprehensive review of the jury reports of two awards in AR of heritage buildings at two different levels (Dutch and European). As previously mentioned, the reason for selecting the Netherlands is because it is among the top countries in AR of existing and more specifically heritage buildings. The jury reports of the NRP Golden Phoenix award (2011 to 2020) were selected as the main source to be reviewed for the Dutch context.

To support the findings, a review of one relevant award at the European level has been conducted:

- Europa Nostra award (2015 to 2021).
The reasons for this selection are:
- Availability of the jury reports;

- Being among the most well-known awards in the Netherlands and at the European level for designers;
- Including at least one AR project among the winners.

It should be mentioned that in addition to the NRP and Europa Nostra awards, the reports of two global awards (Knoll modernism award and Architizer A + Awards) were also reviewed, but both awards have been excluded from this research. The reason for excluding the Knoll modernism award is that based on Douglas's definition of AR [5], the Knoll award included only one AR project, and it was not reasonable to consider it in this review. Regarding the Architizer award, while it included many AR projects, the publications about the winners were mainly based on the description provided by their architects instead of the jury.

Additionally, "Docomomo" (Documentation and Conservation of Buildings and Sites of the Modern Movement), "Agha Khan", and "AHI" (Architectural Heritage Intervention) awards were considered. However, a first screening showed that these awards are not appropriate to be included in this review. Though Docomomo is a well-known organization in stimulating the conservation of modern heritage, there is only one edition of the award (2021), for which no publication is available at the time of writing this paper. The reason for excluding the Agha Khan award was that it has a specific focus on Islamic societies. The AHI award was also not considered in this review because the publications were mainly based on the description provided by the architects, and the comments by the jury were not published.

The jury reports of nine winners of the NRP award in the category of transformation and 39 winners of the Europa Nostra award in the category of conservation have been reviewed (See Appendix A for the list of the selected cases). It should be mentioned that two projects were common in both awards (LocHal in Tilburg and The Halls in Amsterdam). Using the definition of Douglas [5] for AR, only projects with a change in their original function have been considered in this review.

This review followed seven steps:

1. Collection of the data (online access to the regulations and jury reports of the awards).
2. Translation of the Dutch reports in English.
3. Analysis and coding of the texts.
4. Grouping the coded texts in the relevant criteria.
5. Refining and clustering according to a common terminology and further grouping the coded texts.
6. Analysis of the grouped coded texts and reporting the results of the review.
7. Formulation of some general conclusions and recommendations.

It should be mentioned that, in step four, some aspects were included in more than one criterion (e.g., "generation of new employment opportunities", which shows both social and economic effectiveness).

In the results section, three terms have been frequently mentioned; these are used in the present paper with the following meanings:

- Criterion: "Criterion" is a standard by which the final results of AR projects are judged. In this research, the mentioned criteria in the regulations of the NRP award have been used.
- Aspect: "Aspects" show the evidence of achieving a specific "criterion". In this paper, aspects were distilled out of the descriptions provided by the jury in the selected awards.
- Groups of aspects: Aspects have been further clustered in groups, in order to improve their clarity for the analysis and for the possible applicability in the AR process.

3. Effectiveness in Adaptive Reuse of Heritage Buildings

The criteria of effectiveness in AR of heritage buildings have been categorized in five groups based on the NRP award: social value creation, sublimation, environmental

sustainability, economic value creation, and innovation. Hereafter, these criteria and the aspects showing them are discussed.

3.1. Social Value Creation

AR of heritage buildings can provide new social dynamics within their surroundings and facilitate the regeneration of urban areas [23]. Moreover, by involving citizens in the process, their sense of attachment to and pride in their living environment is enhanced [24]. AR of heritage buildings, if conducted properly, can contribute to well-being, amenity, safety, and equity in societies [25–29].

In the scientific literature, many authors have highlighted the social value creation in AR projects from a wide range of different perspectives. Some authors highlight the necessity of improving this criterion via different methods, such as public engagement during the process [30] or gaining insights into the preferences and interests of people via social media analysis [31,32]. They believe that these methods can enhance the sense of attachment of the local communities to the place. Several authors have provided design solutions in AR projects with the final goal of enhancing social values; for example, in [33], the authors have investigated the AR process and more specifically the new addition to an existing building to highlight the collective memories of people.

Other researchers have proposed tools for assessing the impacts of AR projects in contributing to the sustainable development goals, especially social value creation. In [34], the authors have the idea that holistic assessments and analysis of impacts can help and improve future AR projects to comply with the sustainable development goals. However, in the social dimension of sustainable development, they have not thoroughly specified the aspects and have just mentioned four aspects within it.

In the regulations of the NRP award, social value creation has been described with several aspects. These are: improving the livability of the area via the AR of buildings, the appreciation of the users and/or residents, and the connecting effect of the project for the community [21,22,35]. To make these aspects clearer and more specific, the jury reports of this award have been reviewed, and the mentioned aspects related to social value creation have been coded and distilled. These aspects have then been analyzed, refined, and clustered according to a common terminology.

A similar procedure was used in reviewing the jury reports of the Europa Nostra award. In the regulations of the Europa Nostra award, the only aspect which has been mentioned in the criterion of social value creation is the accessibility of the project to the public [36].

The aspects mentioned in the jury reports have then been clustered into several groups. The names of these groups and their definitions are based on the evaluation framework of AR projects by Bosone et al. [17]. However, not all the criteria used by these authors have been mentioned in the jury reports of NRP and Europa Nostra awards. The criteria reported below are those relevant to the aspects distilled from the NRP and Europa Nostra awards.

- Local community: Improvement of the local community via providing education and learning opportunities for them.
- Landscape quality and atmosphere: Improvement of beauty, harmony, and aesthetic values of the landscape, enhancement of the atmosphere of the place, and place-making.
- Safety of public spaces: Improvement of safety and accessibility of public spaces for all.
- Health and well-being: Improvement of mental and physical health of citizens and users related to the AR project (via utilization of green and natural materials, enhancing indoor air quality, natural lighting, etc.).

In the groups of Bosone et al. [17], no specific attention to the “wider community” has been paid. As both the NRP and Europa Nostra awards have considered many aspects related to the wider community, this term has been used to group these aspects.

Table 1 shows the aspects and their grouping in the criterion of social value creation in the NRP and Europa Nostra awards.

Table 1. Social value creation and the aspects representing it (NRP Gulden Fenix Rapporten and Europa Nostra Awards (Laurates) [37–52]).

Aspects Representing the Criterion Based on the Description in the Awards	NRP Award	Europa Nostra Award	Groups of Aspects within the Criterion
Continuation of the city dynamics and becoming a vibrant environment	• ¹	•	Landscape quality and atmosphere * ²
Development of the relationship between people and natural landscape	-	•	
Integration of the heritage building and its surrounding natural landscape	-	•	
Having a major positive effect on the surrounding area	•	-	
Contribution to the revitalization of the neighborhood	•	•	
Creation of more quality and space for social and cultural entrepreneurship and joint new initiatives	•	-	
Appealing new intervention ** ³	•	-	Wider community
Quick acquisition of different target groups to the building	•	-	
Having impressive increment in the national/international visitors	•	•	
Becoming an interesting place for everyone	•	-	
Increment of the accessibility of people to a closed building	•	•	
Becoming a new destination in the city for everyone	•	-	
Attracting wider communities through public and private events	•	•	
Adding a new dimension to the tourism of the area	-	•	
Generation of new employment opportunities **	-	•	
Focusing on knowledge transfer in the field of traditional craftsmanship and other fields for the local community, students, and researchers	•	•	
Active usage of the place via residents, entrepreneurs, and visitors (living, working, meeting, and relaxing)	•	-	Local community *
Strengthening the local community's attachment to the place (living, working, meeting, and relaxing)	•	•	
Keeping the historic stories and memories of the place and people alive	•	-	
Employment of local craftsmen in the process	-	•	
Impressive demonstration of local support	-	•	
Becoming the pride of the residents	•	•	
Enrichment of the quality of life for residents and citizens	•	•	
High involvement of the citizens in the process	•	•	
Provision of space for public amenities to benefit the neighborhood	-	•	
Contribution to providing a safe place for visitors	-	•	Safety of public spaces *
Acoustic comfort and visual peace **	•	-	Well-being and Health *
Provision of a vibrant cultural, educational, and social center for residents and others responding to their needs	•	•	

¹ “•” indicates that the award includes the aspect. ² The groups of aspects which are based on [17] have been marked with an asterisk (“*”). ³ Two asterisks (“**”) indicate that this aspect has been mentioned in other criterion/criteria as well.

Table 1 shows that there are many aspects mentioned in the NRP and Europa Nostra reports in both the “wider community” and the “local community” groups of aspects. In

general, the aspects in Table 1 indicate the reciprocal relationship between people, reused heritage buildings, and the surrounding environment (Figure 1). For example, appealing new interventions attract different groups of people to the building, and this attraction triggers reused heritage buildings being recognized as interesting destinations in the surrounding environment, city, and country. Consequently, more and more visitors come, and by providing the necessary comfort levels for different groups of people (e.g., visitors), the reused heritage buildings contribute to the increment of social values at different scales.

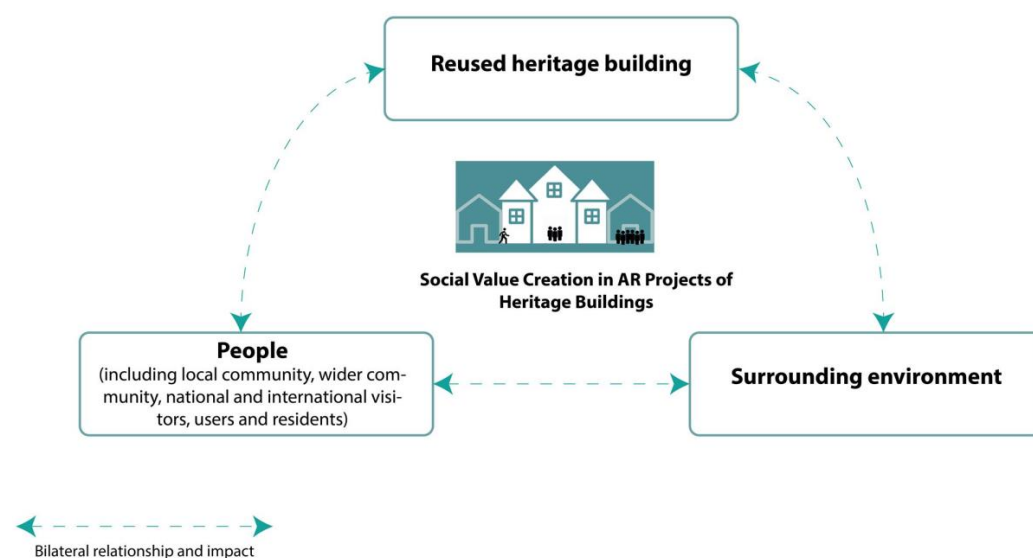


Figure 1. The bilateral relationship and impact between people, reused heritage building, and the surrounding environment.

The similar attention paid to attracting a local as well as a wider community suggests that an effective AR project should be able to keep the balance between these two groups of aspects. When the balance is broken, touristification or isolation of the AR project may occur, both of which could lead to the failure of the project.

3.2. Sublimation

Heritage buildings are characteristic, and often landmarks, that create or enhance the identity of the environment. The preservation and reuse of these buildings contribute to strengthening the culture and histories of societies while responding to the needs in their environment [24]. Although “sublimation” is not a frequently used term for defining effectiveness in AR projects, some researchers have used it as a term to describe protecting the historic environment and its authenticity while improving the qualities of heritage buildings [53]. Similarly, in the regulations of the NRP Golden Phoenix award, sublimation has been mentioned as valuable preservation, restoration, or additions that highlight or reveal the hidden qualities in the project. In other words, the preservation activities make the intrinsic qualities come into bloom [21,22,35].

Though it may seem that sublimation of heritage buildings focuses mainly on preserving the materiality of the buildings, it concerns preserving the culture and authenticity through preservation of specific historic features [54–56]. Reviewing the NRP jury reports supported this belief and led to a division of this criterion into two groups of aspects: “cultural aspects” and “architectural aspects”.

The boundary between these two groups is not always visible; in order to make this clearer in this research, the cultural aspects have been defined as aspects related to preserving the culture, history, and authenticity of the heritage buildings, whereas the architectural aspects are more about spatial interventions or assigning suitable functions to improve the qualities of heritage buildings.

Following the same procedure, the jury reports of the Europa Nostra award have been analyzed. Table 2 shows the aspects and their grouping in the criterion of sublimation-cultural aspects in the NRP and Europa Nostra awards. In Table 2, some of the terms by Bosone et al. [17] have been used to group the aspects mentioned in the awards. These terms and their definition are as follows:

- Authenticity and integrity: Recreation of cultural capital, tangible and intangible, through the preservation of the authenticity and integrity of heritage as defined by UNESCO and ICOMOS.
- Intrinsic value: Recreation and transmission of heritage values and qualities through the AR project (intervention) and hybridization between historic and contemporary values integrated with the cultural landscape and coherent with the intrinsic value of cultural heritage.
- Traditional skills: Improvement of traditional skills through the AR project via providing training opportunities for the local community.
- Local identity: Enhancement of recognition of the local identity through the AR project via the educational function of cultural heritage.
- Mutual cooperation: Improvement of the attitude of stakeholders to mutual cooperation and enhancement of collaboration between public, private, and people.
- Cultural and knowledge capital production: Stimulation of the production of knowledge through the AR project.
- Cultural vibrancy: Increment of cultural activities and events as a result of the AR project.

Dividing the aspects into seven groups indicates the relation between the cultural aspects of the criterion of sublimation and people (local community, wider community, residents, and users). The relationship between people, their stories and memories, and the culture is inevitable. In Table 2, it can be observed that all the groups of aspects are correlated to people. This can be either the case of “authenticity & integrity”, which is indirectly related to people, or “cultural and knowledge capital production”, which directly emphasize the importance of educating people and their cultural engagement in improving this criterion. Thus, it can be concluded that the essence of many aspects in sublimation within the cultural aspects is related to the local/wider community and preserving their culture and histories.

Moreover, this table shows that many aspects have been mentioned in “authenticity and integrity” and “cultural and knowledge capital production” groups; this underlines the attention of the juries to these groups of aspects. The analysis underlines that in dealing with heritage buildings, the heritage values and authenticity of the building need to be preserved. Appraising the values and adding to them should also be significantly considered to guarantee the future of the building. It is also necessary to inform and educate different groups of people (e.g., the local community) about the cultural and historic values of the building. Moreover, conducting and compiling comprehensive research with rich documentation is crucial, as this can provide insightful lessons for the building in the future, as well as similar heritage buildings within the wider context.

Table 2. Sublimation-cultural aspects and the aspects representing it (NRP Gulden Fenix Rapporten and Europa Nostra Awards (Laurates) [37–52]).

Aspects Representing the Criterion Based on the Description in the Awards	NRP Award	Europa Nostra Award	Groups of Aspects within the Criterion
Respect for the history, authenticity, and materials of the heritage building	• ¹	•	Authenticity and Integrity * ²
Preservation of the unity of the heritage building	•	-	
Telling the history of the heritage building	•	-	
Keeping and restoring the original design as much as possible	•	•	
Preservation of the characteristics of the heritage building	•	•	
High-quality restoration of the building and landscape conservation	-	•	
Non-invasive and effective protection of the cultural values of the heritage building	-	•	Intrinsic value *
Realization of a heritage building with future value	•	-	
Proper recognition of the heritage values and restoration to the original shape	-	•	
An excellent recuperation of the heritage building	-	•	Local identity *
Presentation of the history of the site for public viewing	-	•	
Presentation of the long-term and sustained effort to ensure the preservation of the heritage building	-	•	Cultural and knowledge capital production *
Proper narration of the history of the building	•	-	
Effective recovering of the history of the heritage building and its wider context	-	•	
Well-integrated into the wider context of the heritage building	-	•	
Demonstration of the inter-ethnic links of the heritage buildings' history and providing material for comparative evaluation	-	•	
Comprehensive archaeological, structural, and historical research with rich documentation	-	•	
Clear and distinguishable presentation of different phases of the development to visitors	-	•	
Presentation of the historical and contemporary functions and the cultural and artistic aspects of the building	-	•	
Provision of educational programs for the permanent users and others to raise their awareness of its history and important characteristics	-	•	
Restoration with the use of traditional techniques and crafts	-	•	Traditional skills *
Exceptional application of an interdisciplinary approach applied to the project	•	•	Mutual cooperation *
Addition of a new cultural dimension to the area	•	•	Cultural vibrancy *

¹ “•” indicates that the award includes the aspect. ² The groups of aspects which are based on [17] have been marked with an asterisk (“*”).

While in the scientific literature, cultural aspects of sublimation in AR projects have been highlighted significantly, the architectural aspects have received poor attention. Even Bosone et al. [17], one of the most thorough sources for the criteria of effectiveness, didn't mention any points about architectural aspects in AR projects. Thus, for considering the criteria of sublimation referring to architectural aspects, reference is made to the terms used by Schmidt III and Austin [57] for the description of adaptable architecture. Although these authors proposed these terms as “characteristics” to be considered when designing

adaptable buildings, the terms still seem to be appropriate for grouping the architectural aspects distilled from the awards. These terms and their definitions are as follows:

- Joinable/divisible spaces: Provision of spaces that can support multiple spatial arrangements because of being flexible.
- Physical and visual linkage: Enhancement of physical and visual connections between interior and exterior spaces.
- Spatial quality and zones: Accommodation of a variety of spacious and open rooms through spatial separation suitable for different uses and groups of users.
- Multi-functional spaces: Provision of spaces that can be used for multiple users and can service more than a single demographic.
- Reversibility: Provision of the capacity for the interventions within the AR project to be separated from the building (with the minimum of damage).
- Multiple access points: Provision of multiple entry-points to serve different uses or users.

The terms “quality of design, material, and execution” and “complementary redesigns” have been used to group the aspects in the NRP and Europa Nostra awards, which are related to the description of effectiveness in redesigns. They define the qualities which have been considered during the preparation and implementation phases and the qualities provided by the intervention.

Table 3 shows the aspects and their grouping in the criterion of sublimation-architectural aspects in the NRP and Europa Nostra awards.

The eight groups of aspects in Table 3 present many aspects within the architectural aspects of the criterion of sublimation. The essence of some aspects is again surprisingly related to people (local/wider community) and how they experience being in the reused building. For example, in the group of “spatial quality and zones”, there are several aspects that explain the comfort and well-being of users in the AR project at the building scale; all these terms are expressing the human needs within a place, which is, in this case, a reused heritage building. In the NRP award, many specific terms were used to describe these aspects (e.g., openness, visual peace, simplicity, etc.).

Even though the group of “complementary redesigns” focuses on the physical and design aspects of the new addition, these aspects are closely related to improving the understanding of the heritage values by different groups of people. Both groups of “complementary redesigns” and “spatial quality and zones” contain many aspects about the effects of new interventions on heritage buildings, such as assisting heritage buildings to reveal their values and qualities and to make them more visible. It can be observed that having “multi-functional spaces” and adaptability for changes in functions of the spaces is considered an aspect of the effectiveness of AR projects. Moreover, having flexibility and “joinable/dividable spaces” is considered as evidence of effectiveness.

Analysis of the aspects in the criterion of sublimation reveals that again the core identifier of the effectiveness in both cultural and architectural aspects are people, their stories, and their experiences within the space. The reused building itself, the improvement of the physical and design aspects, and preserving the historic and cultural aspects play a parallel role in improving the effectiveness of the reused heritage building (Figure 2). It should be mentioned that the relationship, impact, and influence between the core identifiers is bilateral.

Table 3. Sublimation (architectural aspects) and the aspects representing it (NRP Gulden Fenix Rapporten and Europa Nostra Awards (Laurates) [37–52]).

Aspects Representing the Criterion Based on the Description in the Awards	NRP Award	Europa Nostra Award	Groups of Aspects within the Criterion
Bringing the structure of the building to a human scale	• ¹	-	Joinable/divisible spaces * ²
Flexibility in the layout of the larger areas via adjustable, delicate, and transparent design	•	•	
Improvement of the building through the high quality of the new design and materials	•	•	Quality of design, material, and execution
Excellent execution of the design	•	•	
Appropriate attention to details in the recuperation of the heritage building	•	•	
Securing the structural elements of the building as well as installing essential protective elements	-	•	
Revitalization with a combination of expertise in design and craftsmanship	-	•	
Connection of the heritage building and the new design in a new story	•	-	Physical and visual linkage *
Improvement of the connection of the spaces via the new additions	-	•	
Improvement of the interaction of the heritage building with the surrounding natural landscape	-	•	
Highlighting the values of the heritage building via the new design	•	•	Complementary redesigns
Appropriate balance between the original and new function	•	•	
Helping to increase the understanding of the heritage building	-	•	
Respectful interventions to the architectural essence of the building and its surroundings	-	•	
Innovative design solutions to meet the needs of the users and to preserve the architectural integrity and history of the space	-	•	
Effective preservation via the new contemporary additions	-	•	
Complementing the original design via the addition of new design in a contemporary style with new multi-purpose facilities	-	•	
Clear presentation of the original function of the building in the new design	-	•	
Finding an appropriate use to ensure the future of the heritage building	-	•	
Successful evoking of a dramatic meeting of the old and new parts of the heritage building	-	•	
High-quality preservation and design without any attempt to replicate anything which has come before	-	•	
Well-integrated and respectful new modern additions to the heritage building	-	•	
Complementing the original design via the use of imaginative techniques	-	•	
Creation of a diversity of atmospheres	•	-	Spatial quality and zones *
Creation of a pleasant atmosphere	•	-	
Peaceful and structured spatial organization	•	-	
Acoustic comfort and visual peace ** ³	•	-	
Appealing new intervention **	•	•	
Openness	•	-	
Simplicity and tranquility	•	-	
Clear orientation in the new design	•	-	

Table 3. Cont.

Aspects Representing the Criterion Based on the Description in the Awards	NRP Award	Europa Nostra Award	Groups of Aspects within the Criterion
Bringing an abandoned building back to life with truly imaginative use of the spaces	•	•	Multi-functional spaces *
Having multi-functional spaces for hosting different functions for a wider range of visitors and locals	•	•	
Increment in the functionality of the heritage building	•	-	
Reversibility of the new additions and easily distinguishable from the original fabric	-	•	Reversibility *
Offering accessibility to visitors with disabilities	-	•	Multiple access points *

¹ “•” indicates that the award includes the aspect. ² The groups of aspects which are based on [17] have been marked with an asterisk (“*”). ³ Two asterisks (“**”) indicate that this aspect has been mentioned in other criterion/criteria as well.

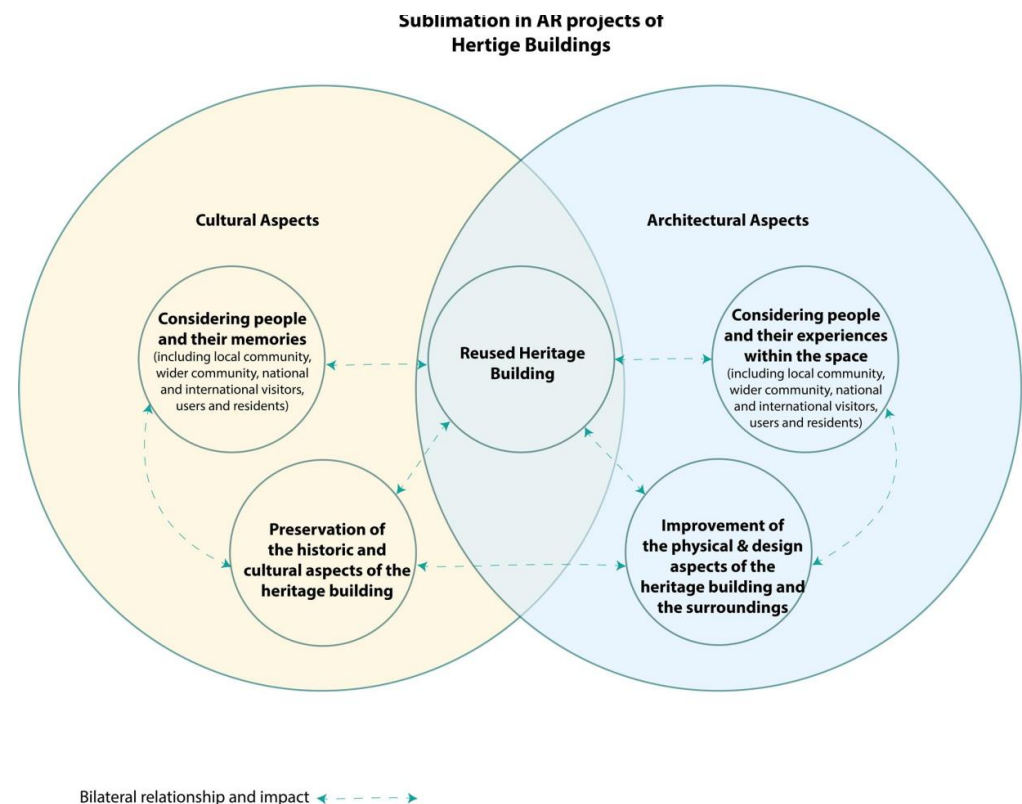


Figure 2. The bilateral relationship and impact between the core identifier of effectiveness in AR projects.

3.3. Environmental Sustainability

AR of heritage buildings has a direct positive effect on environmental sustainability, as it reduces the amount of new construction materials needed and contributes to saving embodied energy [58]. Moreover, during the AR process, many activities are usually conducted to make heritage buildings energy efficient, climate-proof, and healthier [24].

Environmental sustainability is among the hot topics in the restoration and adaptive reuse of heritage buildings. Extensive research has been conducted to bridge the gap between cultural heritage and climate protection either at the broader levels or providing solutions for a particular building. For example, in [59], the authors have conducted a comprehensive analysis of the indoor environment of the heritage building to enhance it in line with the heritage values and characteristics of the building. Similarly, in [60], the

focus is laid on optimizing the energy consumption of the building by providing lessons for similar heritage buildings.

In the regulations of the NRP award, the environmental dimension of sustainability has been frequently mentioned. The explanations in the regulation are about promoting sustainable use of existing built environments; technical measures in the field of materials, water, and energy; and the extent to which the project sets an example in the field of energy transition, climate adaptation, and circularity [21,22,35]. To make these aspects more explicit, the jury reports of the NRP award have been reviewed.

A similar procedure was conducted in the jury reports of the Europa Nostra award. The generalized aspects resulting from the analysis of the jury reports of both awards are presented in Table 4.

Table 4. Environmental sustainability and the aspects representing it (NRP Gulden Fenix Rapporten and Europa Nostra Awards (Laurates) [37–52]).

Aspects Representing the Criterion Based on the Description in the Awards	NRP Award	Europa Nostra Award	Groups of Aspects within the Criterion
Making the heritage building comfortable and energy efficient	● ¹	-	Energy efficiency * ²
Usage of sustainable and local materials with a low carbon footprint	-	●	GHG emissions reduction *
Usage of environmentally sustainable and traditional technologies and design solutions	-	●	
Making the heritage building a circular building	-	●	
Development of innovative and nature-based technologies for the building, as a model for the sustainable transformation of other heritage buildings	-	●	
Making the heritage building as sustainable as possible (CO ₂ neutral)	●	-	

¹ “●” indicates that the award includes the aspect. ² The groups of aspects which are based on [17] have been marked with an asterisk (“*”).

The terms proposed by Bosone et al. [17] as the criteria for evaluating the environmental sustainability of AR projects have been used for grouping the aspects distilled out of the NRP and Europa Nostra awards. However, only two of the criteria proposed by Bosone et al. are relevant to the aspects mentioned in the awards and have been selected. These are the following:

- Energy efficiency: Reduction of energy consumption through compatible technologies with heritage buildings and self-production of energy sources.
- GHG emissions reduction: Contribution to reduce GHG emissions through various methods.

The aspects and their grouping in the criterion of environmental sustainability in the NRP and Europa Nostra awards are outlined in Table 4.

Circularity, comfort, utilization of local materials, and employment of innovative and nature-based technologies in the heritage buildings are among the mentioned aspects. Though this criterion is focused on the building, in Table 4 and among the aspects, it can again be observed that providing comfort for the users in effective AR projects causes them to use sustainable solutions. Providing this necessity via unsustainable solutions can lead to a loss of the values of the heritage buildings [59].

While in the scientific literature (e.g., [17]) many aspects for achieving “environmental sustainability” have been mentioned, Table 2 only covers a few aspects. For example, freshwater efficiency, water quality, and biodiversity are missing. The gap between the aspects in this table as a representative of considering “environmental sustainability” in practice, and the scientific literature on this topic is questionable.

3.4. Economic Value Creation

AR of heritage buildings can contribute to providing more attractive urban areas, which can lead to the creation of economic values. For example, via place branding, adaptive reuse of heritage buildings can lead to the increment of tourists [61], generation of new jobs [17,24], and economic advantages of visiting museums, shops, and the catering industry [62–64].

In the scientific literature, economic value creation is usually mentioned in the research articles which focus on narrating the advantages of AR of heritage buildings along with other added values, such as social, environmental, and cultural (e.g., [17]). However, some research focuses on assessing the economic value added by AR projects (e.g., [64,65]) or providing methodology or tools for enhancing it in line with the sustainable development goals (e.g., [66,67]).

In the regulations of the NRP award, economic value creation has been explained as a demonstrable improvement in the economic structure and value development of real estate. Moreover, it has been mentioned that the business case of the winner projects should be clear, by providing insight into investments and construction costs [21,22,35]. The aspects mentioned in the jury reports of the NRP award have been coded and analyzed.

A similar procedure has been applied to the reports of the Europa Nostra award.

Therefore, in this case, some of the terms used by Bosone et al. [17] for the criteria and their definition have been used:

- Financial self-sustainability: Self-production of financial resources needed for heritage conservation and continuous maintenance independently from the public sector.
- Jobs creation: Creation of long-term jobs directly and indirectly linked to the AR project.
- Economic spillovers: Having direct and indirect economic impacts in the area (e.g., building construction, tourism, research, education, creative activities, and innovation, etc.).
- Attractiveness for creative, cultural, and innovative enterprises: Localization of innovative entrepreneurs, cultural and creative industries, and research and development activities.
- Attractiveness for circular cultural tourism: Enhancement of local economic activities related to circular cultural tourism because of the AR project.

Table 5 shows the aspects and their grouping in the criterion of economic value creation in the NRP and Europa Nostra awards.

While it may be believed that a huge number of subsidies should be provided to have an effective AR project, this review shows that an effective AR project is able to provide the financial resources needed for its life. The ability of AR projects to attract various groups of users and visitors provides financial resources. This attractiveness can make an AR project in a derelict and small city to host thousands of visitors/users (e.g., entrepreneurs) and to bring economic advantages for the whole city.

Here again, the common areas with social value creation can be observed. Attracting various groups of people as tourists lead to providing jobs, which can enhance the social values within the society. Moreover, the initiation of creative, cultural, and innovative enterprises attracts various groups of users to the reused building. However, similar to social value creation, the balance between economic value creation and the heritage values of the buildings should be kept. Incorporating creative and cultural enterprises and industries can usually be in line with the values of the heritage building and can be observed among the functions of winner projects.

Table 5. Economic value creation and the aspects representing it (NRP Gulden Fenix Rapporten and Europa Nostra Awards (Laurates) [37–52]).

Aspects Representing the Criterion Based on the Description in the Awards	NRP Award	Europa Nostra Award	Groups of Aspects within the Criterion
Attainment of more economic value through diverse activities	• ¹	-	Attractiveness for creative, cultural, and innovative enterprises * ²
Housing smaller businesses and workshop spaces for creative businesses	•	•	
Improvement of the economic value of a specific industry	•	•	
Provision of national and international branding	•	-	Attractiveness for circular cultural tourism *
Having economic advantages of attracting visitors to the heritage building	•	•	
Generation of new employment opportunities ** ³	-	•	Jobs creation *
Contribution to the economic growth of the area and the local community	-	•	Economic spillovers *
Generation of financial resources for heritage conservation via different economic activities	-	•	Financial self-sustainability *

¹ “•” indicates that the award includes the aspect. ² The groups of aspects which are based on [17] have been marked with an asterisk (“*”). ³ Two asterisks (“**”) indicate that this aspect has been mentioned in other criterion/criteria as well.

3.5. Innovation

The definition of the term “innovation” is the use of a new idea or method [68]. In the scientific literature of AR of heritage buildings, this term is usually used to mention the employment of digital technologies during different phases of the process. This can be either the pre-project, preparation, implementation, or post-completion phases. For example, in [69], the research aimed at using VR (virtual reality) technology for analysis of the building with the final goal to restore and reuse it. In [70], the authors worked on using augmented reality mobile applications for enhancing the experience of visiting the reused heritage building and the historic city. With the same goal, in some studies, the focus was placed on comparison between two different devices providing augmented reality and VR (e.g., [71]).

In the regulations of the NRP award, “innovation” has been explained as having resourceful solutions with exemplary value in areas such as organization, process, communication, and technology. It shows the degree to which a project has learning effects for future assignments in the field of AR [21,22,35]. To make the aspects of innovation more specific, the jury reports of NRP and Europa Nostra awards have been reviewed and the coded aspects have been reported in Table 6.

Due to the lack of scientific literature on the criterion of innovation in AR projects, the terms used for grouping the aspects in this criterion are defined by the authors as follows:

- Use of digital and innovative technologies: Employment of innovative technologies during different phases of AR projects.
- Cooperation between different stakeholders: Exemplary and admirable cooperation between different groups of stakeholders with learning effects for other projects.
- Replicable model in different aspects: Production of useful models to be implemented by other projects (this group of aspects has been mentioned mainly because of the importance of learning effects of the AR projects in the criterion of innovation).

Table 6. Innovation and the aspects representing it (NRP Gulden Fenix Rapporten and Europa Nostra Awards (Laurates) [37–52]).

Aspects Representing the Criterion Based on the Description in the Awards	NRP Award	Europa Nostra Award	Groups of Aspects within the Criterion
Preservation of the stories and narration of them via development of serious games through AR (augmented reality) and VR (virtual reality)	• ¹	-	Using digital and innovative technologies
Having innovative examples of usage of technology (e.g., for foundation repair) in the restoration and adaptive reuse of the heritage building with advantageous lessons for other projects	•	-	
Showing perfect symbiosis and cooperation between client, manager, and architect with useful lessons for other projects	•	-	Cooperation between different stakeholders
Becoming a model in different aspects for the similar heritage buildings, showing that these heritage buildings have value and contribute to a more sustainable development of the city	•	-	Replicable models in different aspects
Provision of a replicable fundraising strategy developed with the goal of being repeated in similar projects	-	•	
Being an example of a private initiative to reuse a heritage building with beneficial lessons for other similar projects	-	•	
Showing perfect involvement of citizens during the process providing lessons for other projects	-	•	

¹ “•” indicates that the award includes the aspect.

Table 6 outlines the aspects and their grouping in the criterion of innovation in the NRP and Europa Nostra awards.

An effective AR project (in terms of innovation) should have some insightful lessons for other future projects, that is, other projects can be inspired by the employed innovative concepts. These lessons can vary from technical installations to the methods and tools which have been used to involve people during the AR process.

It may seem that there are some overlaps between the aspects of this criterion and other criteria. For example, “cooperation between different stakeholders” may seem similar to group of aspects mentioned in the criterion of sublimation (cultural aspects) of “mutual cooperation” and the one mentioned in the criterion of social value creation of “high involvement of the citizens in the process”. While the essence of these is similar, and all three target improvement of the social and cultural values, the reasons for including it in this criterion is the emphasis of juries on having useful lessons and mentioning it as a valuable and innovative example for other AR projects within the country and the world.

4. Discussion and Conclusions

Reviewing the jury reports of two awards at the Dutch and European levels, the NRP and Europa Nostra awards, provides an overview of the criteria of effectiveness and the aspects considered by the jury (Figure 3). Based on the main aim of this research, recognition of the aspects and grouping them provides useful insights for enhancing the AR process. Moreover, the analysis of these criteria and aspects elucidates some points which will be discussed hereafter.

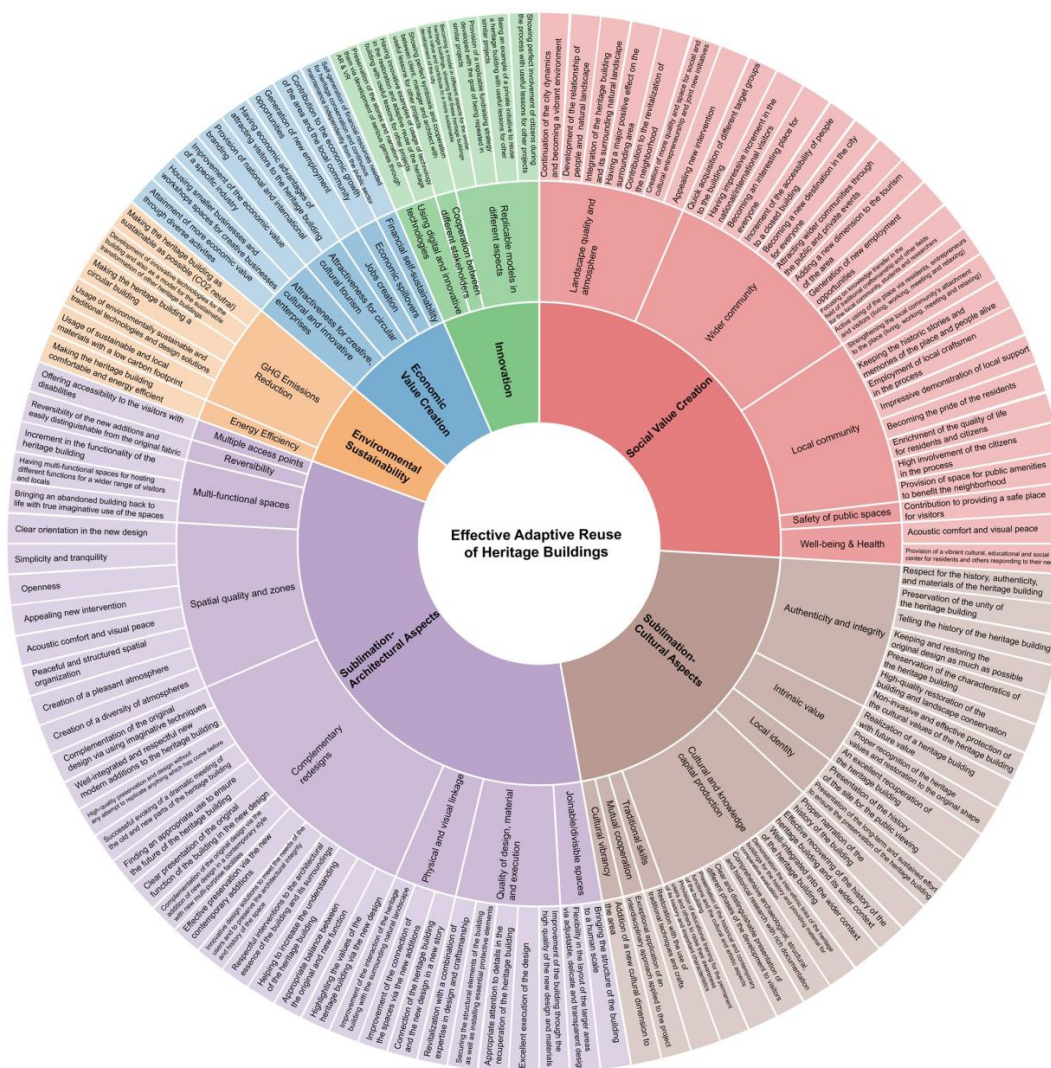


Figure 3. Overview of the criteria (inner ring), groups of aspects (middle ring) and aspects (outer ring) of effectiveness in AR projects of heritage buildings in the NRP and Europa Nostra awards.

It is necessary to note that as the aim of this research is not to judge the awards or their criteria, the frequency of the mentioned aspects has not been considered as showing the importance of one aspect in comparison to the others; however, as the jury are experts in the field of architecture and heritage, emphasizing some criteria by providing a diverse range of aspects has been considered as showing the priority and relevance of them in dealing with heritage buildings (e.g., social value creation).

First, it can be observed that in both awards many aspects of sublimation and social value creation are mentioned; this can be explained by the main scope of these awards. In fact, these awards aim to stimulate AR (adaptive reuse) of heritage buildings, firstly, to preserve and improve their values and, secondly, to encourage people to be more engaged in the process and to increase their sense of attachment to these buildings.

The second point is that the core identifiers of almost all the criteria in effectiveness in AR of heritage buildings are “people” (including local and wider communities, national and international visitors, and users and residences), the “surrounding environment”, and the “reused heritage building”. The distilled aspects mainly revolve around these core identifiers. It is always the question of their impact and influence on each other and how this can be innovatively enhanced.

In the criterion of social value creation, the core identifier “people” is more visible. In Figure 3, it can be observed that a wide range of aspects related to both “local community”

and “wider community” are mentioned in the awards. This shows the acknowledgement of the importance of people and considering them in AR projects. In both awards, the other core identifier of “surrounding environment” can be observed as the group of “landscape quality and atmosphere”, illustrating the positive social effects provided by the AR projects. “Well-being and health” is also one of the groups of aspects, which re-emphasizes the role of considering “people” and their needs in achieving effectiveness in AR projects; however, despite receiving ample attention from the NRP award, the Europa Nostra award does not explicitly mention it.

In the criterion of sublimation (cultural aspects), “authenticity and integrity” has a wide range of aspects mentioned by the juries, which indicates its relevance in the AR of heritage buildings from the perspective of experts in this field. In addition to this, Europa Nostra pays specific attention to “cultural and knowledge capital production” for considering AR projects to be effective. This attention can also be noticed in the other categories within this award, which are “research”, “dedicated service”, and “education, training, and awareness-raising”. Further evidence of this attention is that the Europa Nostra award includes groups of aspects about “traditional skills” and “local identity” in this criterion. This again highlights the role of the core identifier “people”, their stories, and their skills, and its importance to be considered in reusing heritage buildings.

In the criterion of sublimation (architectural aspects), in both awards, the proper recognition of values, preservation, and their incorporation in new designs are appreciated. The balance between original and new designs, hybridization of the heritage and contemporary values, as well as the appropriate meeting of historic and new parts of buildings, are highlighted as positive aspects, especially in the Europa Nostra award. The presence of “multi-functional spaces” and “joinable/divisible spaces” for having flexibility and hosting a wide range of users is considered significant for showing the effectiveness of the AR projects by both awards. “Reversibility” is also highlighted in several cases of the winners of the Europa Nostra award; however, it is not mentioned in the NRP award. This might be considered as a result of a jury consisting of heritage conservation specialists from different countries within Europe with different approaches from the Dutch approach toward conservation, preservation, and AR of heritage buildings.

Based on analysis of the aspects within the criterion of sublimation, the heritage values or the architectural values cannot enhance the sublimation of the building without considering people (including local and wider communities, national and international visitors, and users and residents), their narratives, and values. The comfort and well-being of them and their interaction with the reused heritage building should be constantly monitored and analyzed. In practice, it is usually observed that the follow-up and maintenance mainly focus on the technical aspects of the building. However, the management plans of the reused heritage buildings should have a specific focus on assessing the relationship of people with the reused heritage buildings.

In the scientific literature, pursuing environmental sustainability is often reported as a necessary criterion for considering AR projects to be effective. However, in the awards, little attention is devoted to environmental sustainability; two groups of aspects are mentioned within this criterion: “energy efficiency” and “GHG emissions reductions”. This suggests that the criterion of environmental sustainability should get more attention in awards, and the jury, who are the experts in the field of heritage and architecture, should highlight the necessity of zero-CO₂ emissions heritage buildings and the other aspects mentioned in the scientific literature (e.g., biodiversity). Often, the practice of reusing heritage buildings is considered as an environmentally sustainable action; however, this is not enough, and this criterion needs more attention in practice.

In the criterion of economic value creation, “attractiveness for creative, cultural, and innovative enterprises” and “attractiveness for circular cultural tourism” are among the groups with a wide range of aspects, which underline “national and international branding” and “having economic advantages of attracting visitors”. Despite receiving notable attention in the NRP award, these aspects are not explicitly mentioned in the other award. On

the other hand, in the Europa Nostra award, the importance of “jobs creation”, “economic spillovers”, and “financial self-sustainability” are stressed. This shows the focus of the Europa Nostra award on improving the socio-economic aspects at the local scale via AR projects, which can reduce the risks of over-tourism within the reused heritage building by keeping the balance between economic value and social value creation

Both awards encourage the initiation of innovative, cultural, and creative enterprises within the heritage building. This can be either a fixed or temporary function placed at the heritage building which can invite different groups of people to the building.

In the criterion of innovation, which, based on the definition of NRP, focuses on the learning effects of the AR project, the use of possibilities offered by innovative technologies is appreciated. For example, this can include storytelling for enhancing the experience of visiting the reused heritage buildings or the improvement given by laser scanning to the survey of a building. Despite the acknowledgment by the NRP award, the Europa Nostra award has no specific focus on this group of aspects; however, it highlights the importance of “providing replicable models” for other similar heritage buildings, covering different aspects in all the criteria (e.g., fundraising strategies, people engagement models, management plans of the reused heritage buildings, etc.).

Summarizing, it can be concluded that the attention of the juries in both awards to the criteria of “social value creation” and “sublimation” shows their priority and relevance in AR of heritage buildings for having effective results. This indicates the strong belief that through improving social values, economic values will be created and increased, but focusing mainly on creating economic values, the social values and sublimation of the heritage building may diminish.

The criteria of “social value creation”, “sublimation”, and “economic value creation” have several aspects in common. This underlines their interrelation when coming to an effective AR project, which covers the core identifiers in reusing heritage buildings: “people”, “reused heritage building”, and “surrounding environment”. In other words, creating social values in the heritage building and its surroundings and sublimating their architectural and cultural aspects is more likely to create economic values. This implies that “social value creation” and “sublimation (architectural and cultural aspects)” can be considered as key criteria that highly influence the effectiveness of AR projects of heritage buildings.

The overview of the criteria of effectiveness, as defined in this work, can be useful to guide the ex post evaluation of the AR of heritage buildings and in defining the management plans of the reused heritage buildings. Moreover, it provides an appropriate basis for the investigation of the tools and methods that can be used in the AR process to achieve an effective AR project. The future research will be a retrospective study on the AR process of several effective cases to further analyze the relationship between the aspects of the effectiveness and the methods and tools used by different stakeholders (e.g., architects) with the final scope to enhance the effectiveness of future AR assignments.

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Appendix A

Table A1. List of the selected cases in the NRP Golden Phoenix and Europa Nostra awards.

Award	Case	Year of Winning the Award	Location
NRP Golden Phoenix	LocHal	2019	The Netherlands
NRP Golden Phoenix	Blokhuispoort	2018	The Netherlands
NRP Golden Phoenix	A'dam Toren (A'dam Tower)	2017	The Netherlands
NRP Golden Phoenix	De timmerfabriek (The carpentry factory)	2016	The Netherlands
NRP Golden Phoenix	De Hallen (The Halls)	2015	The Netherlands
NRP Golden Phoenix	Energiehuis (Energy house)	2014	The Netherlands
NRP Golden Phoenix	MetaForum	2013	The Netherlands
NRP Golden Phoenix	Conservatorium (Conservatory hotel)	2012	The Netherlands
NRP Golden Phoenix	Lichttoren (Light tower)	2011	The Netherlands
Europa Nostra	Gare Maritime	2021	Belgium
Europa Nostra	Haus Am Horn	2021	Germany
Europa Nostra	18 Ormond Quay Upper	2021	Ireland
Europa Nostra	Besòs Water Tower	2021	Spain
Europa Nostra	Mas de Burot	2021	Spain
Europa Nostra	Hvar's Arsenal	2020	Croatia
Europa Nostra	LocHal	2020	The Netherlands
Europa Nostra	Manor Farm of Bois de Chênes	2020	Switzerland
Europa Nostra	Castle of Montreuil Bonnin	2019	France
Europa Nostra	Cathedral of Saint Bavo	2019	The Netherlands
Europa Nostra	The Queen Louise Adit Complex	2019	Poland
Europa Nostra	Lithica Quarry of s'Hostal	2019	Spain
Europa Nostra	Medieval Tithe Barn	2019	Sweden
Europa Nostra	Tarsus-Gözlükule Excavations Research Center	2019	Turkey
Europa Nostra	Yr Ysgwrn	2019	United Kingdom
Europa Nostra	St. Wenceslas Rotunda	2018	Czech Republic
Europa Nostra	Poul Egede's Mission House	2018	Denmark
Europa Nostra	The Bac Fortress	2018	Serbia
Europa Nostra	The Pavilion of Prince Milos	2018	Serbia
Europa Nostra	Baroque Complex and Gardens	2017	Czech Republic
Europa Nostra	Bastion of the Grand Master's Palace	2017	Greece
Europa Nostra	The Clerigos' Church and Tower	2017	Portugal
Europa Nostra	Cap Enderrocat Fortress	2017	Spain
Europa Nostra	Roof for the Ruins of the Monastery of San Juan	2017	Spain
Europa Nostra	Kilic Ali Pasa Hamam, Istanbul, TURKEY	2017	Turkey
Europa Nostra	Cromford Mills: Building 17	2017	United Kingdom
Europa Nostra	Conversion of De Hoorn brewery into a creative hub	2016	Belgium
Europa Nostra	The French Hospital	2016	Iceland
Europa Nostra	The Diocletian Baths: charterhouse and open-air pool	2016	Italy
Europa Nostra	Museum Oud Amelisweerd in Bunnik	2016	The Netherlands
Europa Nostra	Fort Kijkuit in Kortenhoef	2016	The Netherlands
Europa Nostra	Knockando Wool mill	2016	United Kingdom
Europa Nostra	Boulingrin Central Market Hall	2015	France
Europa Nostra	Antouaniko Mansion	2015	Greece
Europa Nostra	The Halls Amsterdam: Centre for Media, Fashion Culture and Crafts	2015	The Netherlands
Europa Nostra	Manor House in Eidsvoll	2015	Norway
Europa Nostra	Cathedral in Tarazona	2015	Spain
Europa Nostra	Armenian Church of St. Giragos	2015	Turkey
Europa Nostra	Middleport Pottery	2015	United Kingdom

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