

# Sustainability Assessment of Urban Heritage Sites

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**Abstract:** The purpose of this research was to create a framework of indicators that enabled us to measure the classic dimensions of sustainable development (SD): People, Planet, and Profit, in combination with the sustainability of the heritage values and the policy dimension. Methods developed as an approach to sustainable urban planning and that were based on system analysis models were modified, streamlined, and adapted into a concrete set of indicators for historical city sites. This framework, a multimodal system which maps out the holistic sustainability could serve as an incentive from the policy to the heritage world to implement sustainable objectives; and it could be used as an extra argument for the broader social relevance of heritage care.

**Keywords:** indicators; multimodal system analysis; urban heritage sites

## 1. Introduction

In the field of urban planning, hundreds of different methods and tools have been developed to measure the sustainability of the built environment, each with its own perspective, approach, or goal. Unfortunately, none of these urban planning tools is adapted to the specific characteristics of a heritage site, which in turn makes them unsuitable in heritage conservation. In the best case, heritage aspects receive limited attention as a single indicator or sub-indicator. Many elements that are essential for an integrated sustainability assessment of specific cases, like cultural heritage sites, are simply overlooked in heritage value-based management. Avrami states that “Now, more than ever before, the heritage field is faced with the need to qualify and quantify its fundamental contributions to society and sustainability. Whether through environmental, economic, or social benefits, the field must robustly demonstrate how it improves quality of life for communities. Realigning the goals of heritage conservation to ensure that they serve the greater good of the sustainability cause is an important first step” [1] (p. 9).

### 1.1. The Brundtland Definition as a Starting Point

Employing an analogy with the Brundtland definition, sustainable management of heritage sites is about how we can optimize the appreciation of our heritage in such a way, that it will still be relevant in the future [2]. Although the Brundtland definition originally starts from holistic sustainability, in recent years due to the presence of climate change and energy efficiency in planning processes, the focus has shifted to the Planet pillar. To most policymakers, social and economic sustainability are rather hazy concepts, which are difficult to communicate in contrast to climate problems. David Throsby points out that a holistic, multidisciplinary evaluation method is therefore necessary to overcome the shortcomings of environmental technology evaluation systems [3] (pp. 8–9); for example, social aspects also play an important role, particularly, architectural heritage is more preserved when social aspects have a high score.

### 1.2. Diachronic and Synchronic Relationships of Sustainable Development (SD)

When considering sustainable development (SD) in a heritage context, usually two approaches can be distinguished. In the first approach, the site is evaluated with the same criteria and instruments used for the SD of modern buildings or urban projects (sustainable development in general), whilst in the second approach the sustainability of heritage values is evaluated (sustainable heritage management). In the first case, the methodology is not adapted to heritage sites, so many specific heritage aspects are not covered. In the second case, the evaluation remains limited to cultural heritage management, and most quality aspects related to the contemporary and future functional use of the site are disregarded.

A tool that incorporates both approaches means that the two columns in Figure 1 are merged, and by merging the diachronic relationships and the synchronous analogies, new connections become clear. Whilst the two approaches were separated in the first scheme and only diachronic relationships were important, in the integrated approach, the synchronous and combined syn–diachronic connections are taken into account.

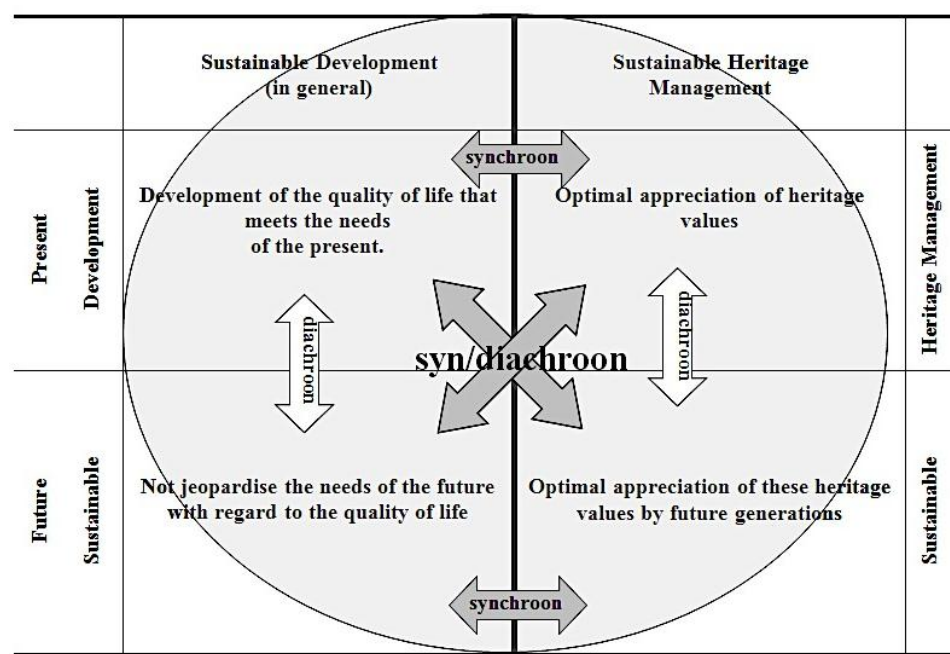


Figure 1. Integrated approach of SD of heritage sites.

In this integrated approach, optimal appreciation of heritage values goes hand in hand in the three directions, which results in:

- The improvement of the quality of life, according to current needs (synchronic).
- The protection of future needs, in terms of quality of life (syn–diachronic).
- The enjoyment of these heritage values by future generations (diachronic).

The same applies in any case, in three directions, for each of the four components in this scheme.

## 2. Aim and Methodology: Search for a Holistic Vision

The aim of our research is to create a holistic framework, based on a set of indicators to advocate the benefits of heritage preservation in terms of SD-tailored protection of historic city fragments. The importance of a holistic approach in the planning of historic urban areas was already stressed in the Granada Convention [4] and the Charter of Washington [5].

Cultural heritage and sustainability are dynamic systems, hence a multimodal system is required that describes all the aspects and their mutual interrelations in an integrated way. The multimodal system analysis of the Dutch lawyer–philosopher Dooyeweerd, is used as a frame of reference to approach this complex problem in a holistic way. Furthermore, Lombardi and Brandon [6,7] and Vandevyvere [8] adopted this multimodal system analysis to evaluate sustainability in the built environment. The modal spheres or law spheres as developed by Dooyeweerd, do not refer to “what”, but to “how” the reality manifests itself to the human experience [9]. These modalities ground things or objects in terms of significance rather than in terms of existence. This theory can be used as an epistemological exercise to check the proposed set of indicators on completeness and coherence.

The methodology of this research was based on two surveys. On the one hand, we followed a theoretical track in which a literature study involving insights and methods from other disciplines can be applied to heritage sites. On the other hand, an empirical track was followed to create a conceptual framework in which the indicators were chosen based on the conclusions of the theoretical and comparative study of existing tools, frameworks, and strategies.

The proposed holistic and participatory evaluation method may be a tool that could be integrated in the management of world heritage sites. In the same vein is the Historic Urban Landscape approach (HUL-approach). This concept, proposed by UNESCO, approaches historic city fragments as landscapes in a broad context, with a stratification that goes beyond the pure architectural characteristics. It considers intangible aspects, contemporary social and cultural values, economic processes, and physico-spatial characteristics [8] art. 4 and 6. The HUL-approach aims to integrate urban heritage management into a general framework for sustainable development and is opposite to this research. The uniqueness of the proposed framework lies in the fact that it starts from existing urban tools, which are adapted to a heritage context.

### 3. Theoretical Track: The Multimodal System as an Epistemological Exercise

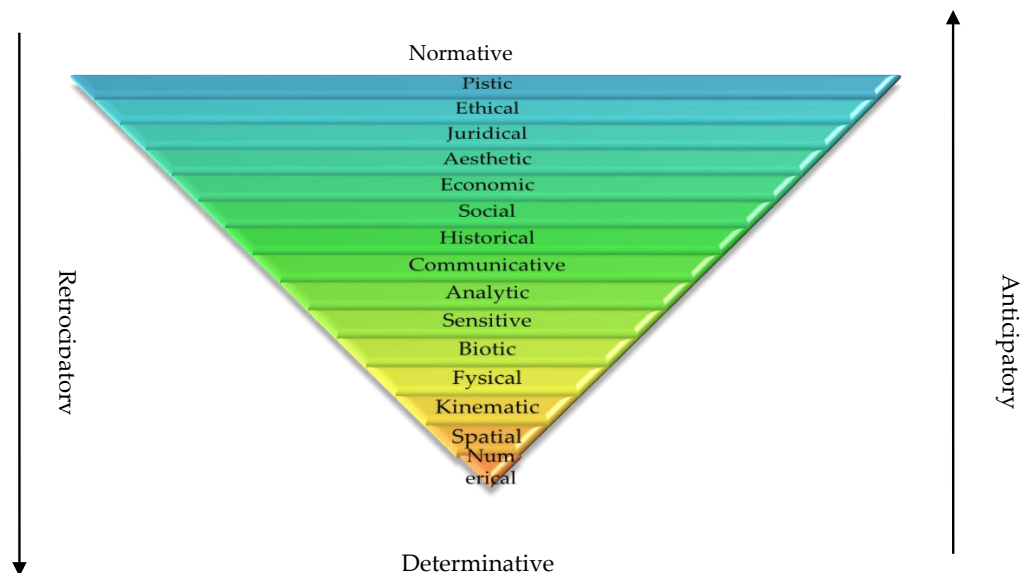
The spheres of the multimodal system of Dooyeweerd are adjusted in order to be applied to cultural heritage. Fifteen aspects of temporal reality, or modalities/spheres, or ways of being are distinguished: numerical (quantitative), spatial, kinematic, physical, biotic, psychic (sensitive), analytical (logic), historic (cultural), communicative, social, economic, aesthetic, juridical, ethical, and pistic (faith).

The first three modal spheres (numerical, spatial and kinematic), are the most fundamental and determinative ones. The higher in the ranking, the more the normative character is highlighted. The highest modal spheres (e.g., pistic, ethical, legal), are based more on human value judgments than the lower ones. The spheres refer to each other by anticipations and retrocitations. In this way, one modality is metaphorically described by the idiom of another [9] (p. 109). Heritage, for example, can be described on the basis of economic value, which in turn can be expressed in price (the numerical aspect). Such a “backward” relationship, although it is accompanied by the loss of a certain meaning, is called a retrocipation by Dooyeweerd. Additionally, in the reverse sense heritage is anticipatory, related to the legal, ethical and pistic aspects, for example in the form a protected monument prescribed by law, a site that is accessible to everyone, or a memorial, thus gaining in significance. Dooyeweerd considered this system of modal spheres, anticipation and retrocipation, the “cosmic order of time”.

A holistic point of view to sustainability ensures a system that functions in a way that all spheres are covered, and their appropriate laws are respected see Figure 2.

From the point of view of protected historic city fragments, or World Heritage sites, the multimodal analysis these valuable sites are situated in the historic ‘law sphere’. To neglect SD can have a destructive impact on several levels in the form of a decrease of legibility due to too many tourist facilities (communication), the unravelling of the social fabric (social), loss of employment (economic), and a reduction of the image quality because of degradation and vacancy (aesthetic) with legal consequences (juridical). This will finally result in less intergenerational responsibility (ethical) and no voluntarism (pistic). In this case, due to unsustainable heritage management, the historic

modality is affected, and because this aspect is also a basis or substratum of the higher modalities (superstrata), in the long term the latter will be undermined in an anticipative way. On the other hand, this historic modality as superstratum is retrocipatively connected with its lower modalities and will have a destructive effect on them in the form of the loss of scientific knowledge (analytic), perception of a harsh environment (sensitive), environmental pollution (biotic), safety problems (kinematic), and inefficient use of space and buildings (spatial).



**Figure 2.** The modal spheres of Dooyeweerd [10]: When all the law spheres are respected, a good balance and sustainability are received.

The relevance of the multimodal system analysis is also illustrated by the research of Lombardi and Brandon [6,7]. They reported on the example of a spatial development project in Italy, where four different parties proposed their own project scenario. A multimodal analysis was conducted to identify the differences and interfaces. In terms of differences, primarily the pistic aspect revealed the underlying interests. The result of this explication and the discovery of new interfaces, was that finally the debate was forced into the open and made it more transparent, so that new opportunities arose that led to a negotiated compromise. By way of illustration, we look at a discussion on the application of insulating measures in a monument by two different parties, a heritage expert and an ecologist, both putting forward their own sustainability scenarios. The heritage expert, who is in favor of energy savings, will rigorously combat every disruptive impact from the point of view of heritage conservation, whilst the ecologist, who recognizes the importance of heritage for integral sustainability, will propose drastic interventions from the point of view of energy saving. Although both parties situate themselves within the same ethical value perspective that implies maximum integrated SD, they monopolize the discussion by focusing on only one modal aspect (historical versus economical or physical). Mapping of the different interests, perspectives, and definitions on sustainability ensures clearance in order to find a creative, interdisciplinary solution. The search for a “common ground” and awareness of the influence of value perspectives “perspective adoption”, are indeed basic conditions of each interdisciplinary research.

#### 4. Empirical Track: Creation of a Set of Indicators

In the creation of a set of indicators, a holistic vision is indispensable [11] (pp. 57–58). As Rotmans and de Vries pointed out that “Indicators describe complex phenomena in a (quasi-) quantitative way by simplifying them in such a way that communication is possible with specific user groups” [12].

#### 4.1. References and Principles for a Set of Indicators

The Dutch DuMo model is not a holistic instrument, which is why the 20 strategies for sustainable preservation of monuments listed at the DuMo-calculation were used as inspiration and illustration, for the indicators of the Planet and Patrimony (Heritage) pillars [13]. These strategies are no indicators by themselves, but they are formulated in the form of recommendations and are in fact designed to create a customized solution.

In addition, Stubbs framework based on his experiences with 3 heritage projects in England, with a high content of social participation and local anchoring, acts as a reference for our set of indicators [14]. Stubbs framework had a specific focus on sense of place, community building, and public perception (social aspects of SD) reflecting the social turn [14–16]. For the fourth pillar, Stubbs [14] classified the indicators in analogy with Vandevyvere [9], except that for the fourth pillar he used the undemanding name ‘generic’ to accommodate public perception. The theme ‘generic’ in the framework of Stubbs’ can be regarded as being multimodal in reference to the ethical and pistic spheres. It is also interesting to note that Stubbs in the Planet pillar provided an indicator for climate change adaptation. This indicator is not included in this research because until now, there is hardly any research in Flanders about the impact of climate change on the built heritage.

Vandevyvere streamlined this method to a concrete set of indicators for the city districts based on a thorough comparative study by selecting the best known evaluation tools of that moment [9]. This research, was used as a guideline because of its strong substantive basis and the fact that Vandevyvere used the same principles, the multimodal perspective, and the same scale as the research object. Lombardi and Brandon outlined the 15 modal aspects of Dooyeweerd into a questionnaire [6]. Vandevyvere reversed this way of working by selecting a number of indicators, which were tested in a multimodal framework [9] (pp. 109–110, 116).

#### 4.2. Criteria for the Selection of the Appropriate Indicators

The selection of the appropriate indicators depends firstly, on pragmatic factors, such as system boundaries (scale and typology of heritage) and availability of data, and secondly, on rather subjective aspects, such as the L, C, S-criteria, as defined by Clark et al.: “*The most influential assessments are those that are simultaneously perceived by a broad array of actors to possess 3 attributes: legitimacy, credibility and salience*” [17] p. 7. Creating a set of indicators is a methodological compromise between local relevance, practical feasibility, availability of data, and theoretical justification. Several authors have set down criteria that sustainable indicators should meet [18–20]. Although they all provide useful guidance, all these criteria can be reduced to the L, C, S criteria.

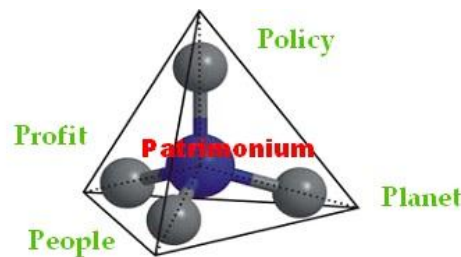
- *Salience*: Is the indicator relevant to the type and scale of the heritage? Does the indicator meet the adequate scope of Bellagio-principle 5 [21] (pp. 1–4)? Is the indicator relevant for long-term sustainability and does it play an important role at higher levels than the local one? Is the indicator significant for the actors involved (both policy and public), but also, is the indicator clear, unambiguous, and usable to communicate?
- *Credibility (realistic measurability)*: Are the collected data for the indicator available, and in terms of time budget, are they technically feasible?
- *Legitimacy*: Is the indicator acceptable for all parties involved, both for experts (scientific validity) and stakeholders? This can be adequately consulted by the questionnaires in the context of the weighting.

#### 4.3. Five Pillars of Sustainable Development

In addressing the question of how SD and heritage are interconnected, the classical three-pillar structure is extended to five pillars, including Policy and Patrimony (heritage). In order to realize a sustainable cultural development and management, it is important that these pillars are of equal value and that there is a constant interaction between them.



Although in principle, there is no hierarchy between the original sustainability pillars, the relative position of each pillar in this model is important as shown in Figure 3. Given that the Policy-pillar contains the highest normative modalities and has a steering function, it can be seen as overarching against the other pillars. Secondly, in this research the theme of the Patrimony-pillar is basically the central starting point, a kind of ‘heritage’ bias. In this way, we can imagine sustainable heritage management as a three-dimensional tetrahedral molecule. The idea to add an overarching institutional pillar to the three dimensional version is indebted to Valentin and Spangenberg, and gives a clear presentation of both the differences and the interconnectedness of the different components of SD [22].



**Figure 3.** The tetrahedron presentation of sustainable development (SD) of Patrimony (heritage).

The indicators can be located on the corner points (vertices), or on the ribs of the prism to display individual sustainability themes, or aspects that indicate the interconnectivity. Applied to the proposed indicators, a tetrahedron which starts from the point of view of the heritage (Patrimony) contains many indicators that will be located on the connections (the ribs), between the central Patrimony pool and the four vertices. For example, an indicator about the enclosure or opening-up of heritage could be located on the connection between People and Patrimony (heritage). A (sub) indicator on successful integration of modern facilities for energy efficiency in a heritage context, is located on the connection between Patrimony and Planet, and so on. On the other hand, there will be indicators that are only positioned in this or that vertex, e.g., the mere use of green energy in the Planet vertex, and an indicator on the presence of policy planning in the Policy vertex.

A project on sustainability of heritage can be considered as a point within this three-dimensional structure where its positioning displays the average of all indicators. A heritage project is sustainable, as long as it remains within the five P-tetrahedron. The positioning, with regard to the vertices can be different according to other emphases (weights). This multidimensional presentation shows that SD has no unambiguously definable optimum, as would be the case in a two-dimensional model. It illustrates the fact that, although an evaluation will be based on a whole set of various indicators, one indicator can get more priority (weight) than another, as long as the total project is located within the limits of the tetrahedron.

#### 4.4. Creation of a Set of Indicators

Based on these theoretical conclusions and built on existing models, 22 indicators were defined, most of them subdivided into sub-indicators. In Figure 4 the modal spheres of Dooyeweerd are related with the pillars of sustainability and the indicators developed on the scale of historic urban fragments.

- *People indicators: ‘sense of place’, ‘community building’ and ‘safety’.*

The indicator ‘sense of place’ assesses the experience of people within a specific setting; the associations, the feelings, and the sentiments that are evoked by a historic space. The indicator community building refers to the degree with which a site is able to create a balanced, coherent, and well-functioning community and refers to the sub-indicators: integration or social inclusiveness and sociability or the way a built environment encourages social life. Safety is an essential condition

for the attractiveness of the site and for improving the well-being of a neighborhood [23]. Physical and social safety mutually reinforce each other [24].

- *Planet indicators: 'Use of material', 'energy', 'water', 'mobility', 'biodiversity', 'use of space', and 'pollution/nuisance'.*

'Planet' refers to the testing of sustainable environmental aspects. The indicator 'use of materials' evaluates the conscious choice, or at least demonstrable sustainable materials for the refurbishment or replacement of restorations or modern additions of the site. The indicator 'energy' describes the sustainability of energy consumption, in terms of the trias energetica [25] (pp. 43–45). Moreover, the rational and sustainable use of 'water', both in terms of consumption and the drainage of rain water is assessed by this indicator. 'Mobility' refers to the extent to which the site is easily accessible by public transportation, and soft traffic is encouraged. The overall quality of the ecosystem, 'biodiversity', is conceived in biological sense. It comes as both the biodiversity on measures for conservation, restoration, and compensation. The indicator 'use of space' is related to the appropriate and effective spatial use of the site. 'Pollution/nuisance' is a container indicator that maps out all forms of pollution or nuisance.

- *Profit indicators: 'Local employment', 'economic embedding', and 'future value'.*




When considering economic sustainability, we think in the first place of the so-called return on investment. Ideally, this should be measured with a CBA (cost-benefit analysis). However, it is clear that a full CBA, as part of a sustainability analysis, in terms of data gathering is not always realistic. Therefore this pillar is limited to indicators like, 'local employment', which is relatively simple to measure, and 'economic embedding', and 'future value', which are indicators with a qualitative score. 'Economic embedding' evaluates the economic role of the site in a broader context, and particularly the influence on tourism. 'Future value' is by definition what SD is about. Here the functional flexibility of the site is examined in relation to future developments; financial capacity in the sense of the financial resources that are available for the heritage project is measured in the Policy pillar by the indicator 'legal certainty'.

- *Policy indicators: 'planning/process quality', 'legal certainty', 'integrity' and 'voluntarism'.*

The first indicator 'planning and process quality', measures to what extent a kind of planning is present, as well as a follow-up of the realization of the objectives of this planning. 'Legal certainty' assesses if economic, social, and heritage aspects of the site are supported and encouraged by the government. 'Integrity' evaluates the extent to which stakeholders endorse the Brundtland definition of SD, in a holistic way. 'Voluntarism' is an indicator that refers to the pistic modality of Dooyeweerd [10] and the category "generic" of Stubbs [14]; and it measures the extent to which the parties involved are convinced of the overriding importance of SD for heritage care and vice versa.

- *Patrimony indicators: 'integration of modern techniques', 'physical and psychological accessibility' (enclosure or opening up), 'knowledge building', 'spatial aesthetics' (tangible aspects), and 'immaterial cultural heritage' (intangible aspects).*

Whilst in the other pillars, the environmental, social, and economic impact of the heritage and the political focus and care are assessed, the Patrimony pillar measures the way in which the heritage itself is valued. The indicators of this pillar should be seen in relation to the manner in which a site is managed and developed to ensure optimal appreciation, and in the context of how the sustainability of the heritage values is guaranteed. The Patrimony indicators are summarized in five indicators, which on one hand are based on the listed practical input and inspirational references (4.1 *References and principles for set of indicators*), and on the other hand, on the most important charters of the last decades. The related indicators are underpinned by international charters.

Modal spheres	Pillar	Indicators (and sub-indicators) An example of application for cultural heritage	Normative
Pistic	Policy	Voluntarism (Convinced vision on heritage)	
Ethical	Policy	Integrity (subscribe the SD – Brundtland, awareness raising of SD)	
	Patrimony	Accessibility and enclosure (opening up of heritage sites - universal design)	
Juridical	Policy	Planning and process quality (presence of planning, inter-sectorial consultations)	
	Policy	Legal security and support	
	Patrimony	Knowledge building	
	Patrimony	Heritage values (protection status, inventory built heritage)	
Aesthetic	Patrimony	Spatial aesthetics (harmonic integration of modern techniques in relationship with the heritage values)	
Economic	Profit	Economic embedding (economic spill-over effect)	
	Profit	Local Employment (permanent jobs, quality of the job offer, temporal jobs)	
	Profit	Future value (economic capital, return on investment, cost)	
Social	People	Sense of Place	
	People	Community building aspect, (integration and sociability)	
	People	Safety (physical safety, e.g. social control, criminality, presence of police and road safety)	
Communicative	Patrimony	Accessibility and enclosure (accessibility of information, good signals, ...)	
	Patrimony	Knowledge building (heritage education)	
Historic/Cultural	Patrimony	Heritage aspects: tangible and intangible, (traditional techniques)	
Analytic	Patrimony	Scientific knowledge building (logical approach of the theme)	
Sensitive	People	Sense of place (influence on the overall well-being, quality of life)	
	Patrimony	Spatial aesthetics (multi-sensorial aspects)	
Biotic	Planet	Biodiversity (influence on the natural environment),	
	Patrimony	Spatial aesthetics (Integration of green and water)	
Physical	Planet	Use of materials,	
	Planet	Use of energy,	
	Planet	Use of water	
	Planet	Use of space (vacancy and decay, density)	
Kinematic	Planet	Mobility (use of public transport, comfort of soft transport) distance to the center of the city)	
	Patrimony	Physical accessibility, (intern circulation)	
Spatial	Patrimony	Spatial aesthetics (integration of art, harmony of the architectural composition, legibility of the site)	
Numerical	Planet	Quantitative aspects like:	
		Pollution/nuisance (waste, air quality, noise,...)	
			Determinative

**Figure 4.** The modal spheres of Dooyeweerd in relationship with the pillars of sustainability and the indicators developed on the scale of historic urban fragments.

The indicator ‘integration of modern techniques’, assesses if modern requirements are applied in a harmonic way with the surroundings and without prejudicing the values of the heritage. ‘Physical and inclusive psychological’ inclusion of information is important, and is a constant theme in the international charters [26] (art. 16); [5] (art. 15); [27] (art. 25); [28] (art. 6–10); [29] (art. 25). ‘Spatial



aesthetics' addresses the integration of green, water, and art, as well as the overall multi-sensorial aesthetic quality. 'Immaterial heritage' covers besides legends, stories also, museum initiatives, cultural activities, and material elements on the site that have a link with the immaterial heritage.

Figure 4 shows the relationship between the model spheres of Dooyeweerd and the 5 pillars of SD, with their corresponding indicators and sub-indicators.

A holistic approach includes a wide range of modalities that extend from extremely determinative or substantive, to very normative or subjective. The determinative (quantitative) aspects can be assessed by quantitative methods; the normative aspects (pistic) by qualitative ones. To assess the aspects in between, a combination of quantitative and qualitative techniques is useful. SD, as well as preservation of heritage, are strongly value-based disciplines; hence the complete exclusion of subjectivity is utopian. A multi-criteria analysis is proposed as an efficient means to evaluate the quantitative, as well as the qualitative, indicators.

In a set of indicators, certain indicators get more weight than others because of a thematic focus. From an objective point of view there is no absolute, value-free standard for sustainability. By applying a set of indicators; SD of heritage sites will be measurable and presented clearly, but we should be aware that the creation of such a framework in itself is never a value-free concern.

## 5. Case Study: The Beguinage of the Minnewater Site in Bruges, Belgium (World Heritage Site)

The set of indicators was tested in a case study of the protected cityscape of Minnewater, in Bruges. The site, Minnewater, Figure 5, is about 16 hectares and is located in the southern part of the historic world heritage city Bruges. For many tourists this site is the gate to enter Bruges because the site is very accessible by public and soft transport. The site consists of a number of protected relics and iconic landscape elements, which are grouped around the Lake Minnewater. The site comprises of nine sub-areas and is characterized by little spatial cohesion. In the Northwest of the site, the Beguinage is located. This Beguinage of the 13th century, Figure 6, is a protected site since 1996 and in 1998, together with the 12 other Flemish Beguinages was included on the UNESCO world heritage list because '*beguinages are exceptional witnesses to the cultural tradition of independent religious women in north-western Europe in the Middle Ages.*'

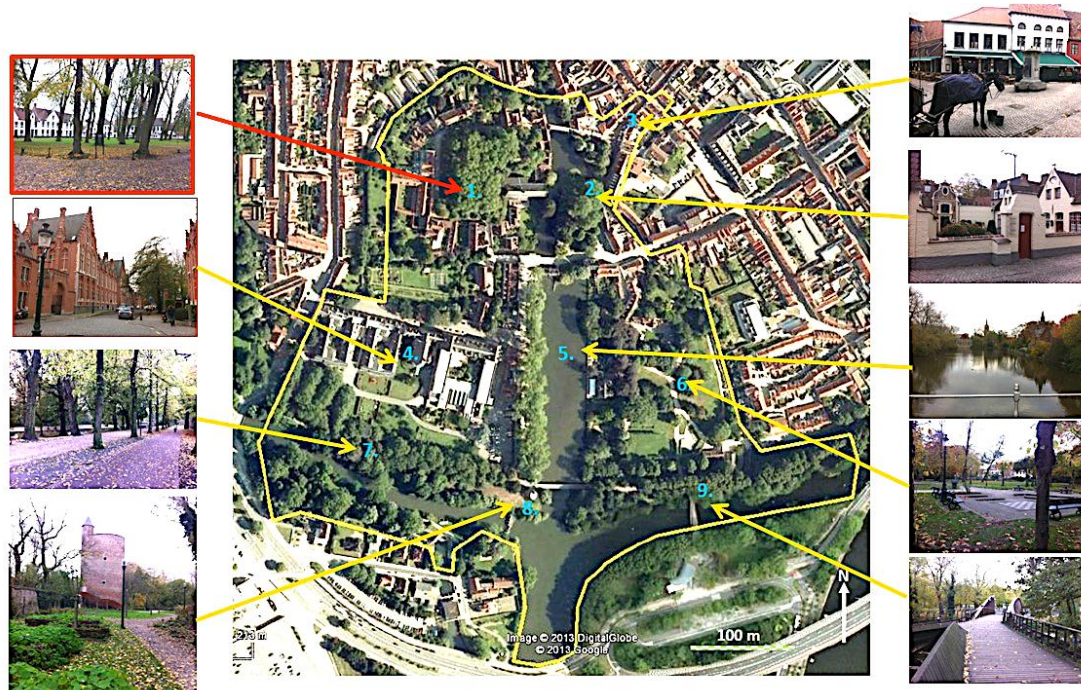


Figure 5. Minnewater site in Bruges, Belgium, Beguinage (red indicated).



**Figure 6.** The Beguinage of the Minnewater site in Bruges, Belgium [30].

### 5.1. Quick Scan as a Test

A quick-scan was used as an illustration and test of the proposed methodology. The information was collected using questionnaires and in-depth interviews of experts of the heritage and urban department of the city of Bruges, and local heritage experts. To obtain an assessment of the indicators by the habitants, a questionnaire was submitted to 18 inhabitants, where 15 of them wanted to participate. In addition, 15 local employers were interrogated separately on the economic indicators. Respondents were asked to fill in an excel file, distributing 100 points on the 22 indicators, depending on the relative importance that he or she attached to the indicator in question. The weight of the indicator was defined by different groups of stakeholders related with the heritage site, and mainly those concerned with decision-making process. The scores of the indicators were multiplied by average weighting factors to obtain a weighted final score.

### 5.2. Chart Beguinage Area—Minnewater

Most instruments for sustainability that analyze the partial scores are displayed by the radar chart. The circular structure emphasizes the unity and principled equality of the indicators, and is therefore an appropriate visual representation of the holistic approach.

The global high score also indicates that the sectoral focus on heritage, successfully goes hand in hand with other aspects of sustainable development. Sense of place, community building, and future value get the highest weight. The cityscape Minnewater, is an example of a site where there is an intrinsic and sustained consideration of the values of the heritage, on the one hand, by the high degree of legal protection and on the other hand, by the enormous heritage tradition and expertise of the heritage and urban planning department of the city of Bruges. Energy is the only ecological indicator that scores just a pass grade. Therefore the use of renewable energy must be stimulated.

### 5.3. SWOT Analysis

The SWOT analysis of this survey as shown in Figure 7 revealed that the strengths were sense of place where people are proud to live in this area; also, a strong economic embedding and a strong planning and cross-sectorial consultation. Furthermore, financial support of the government



is important for qualitative preservation of the cultural heritage site. Voluntarism, a spontaneous stewardship, is especially present with the inhabitants of the Beguinage.

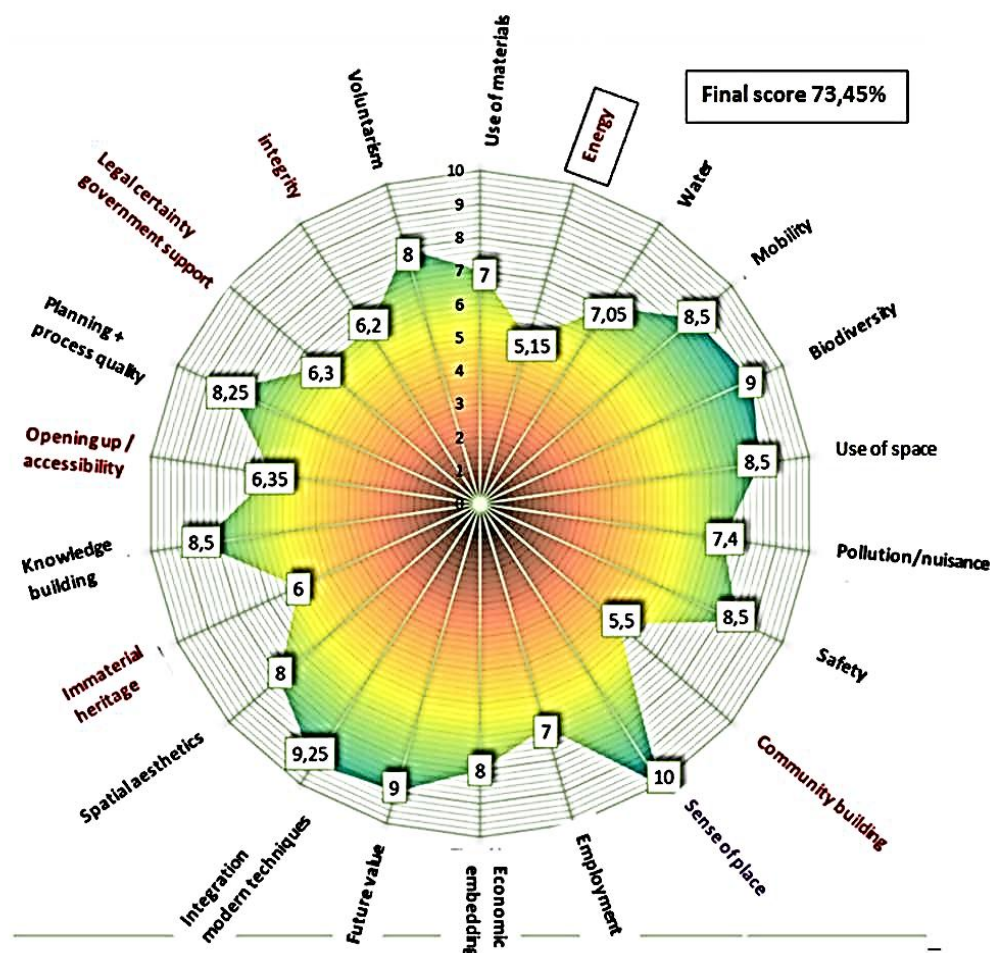


Figure 7. Chart Beguinage area—Minnewater.

Points of weakness for the Heritage-pillar were the information disclosure or opening up of the cultural heritage. The power of communication draws attention because only a little information on the cultural heritage is accessible, in particular, the consideration of intangible heritage aspects is an aspect of concern. Minnewater is an area with little or no local participation, only a few inhabitants are passive members of a Heritage Association. There is no social mix and in general, the properties of this site are in a higher price range. Many buildings have a low energy performance, resulting in a low level comfort for users.

Analysis reveals that the most important aspect that offers an opportunity for a long term sustainable development is heritage participation. However, there were no real consultation structures for local participation and many residents had a feeling of uncertainty about the heritage policy, and especially about the UNESCO status. There is a need for an intermediate point of contact, to provide clear communication about the UNESCO protection to the citizens, as well as to the local authorities. A second point that needs to be improved, is the unlocking of intangible heritage because currently the history and anecdotes of the site are only sporadically explained on information boards in situ. Moreover, public knowledge about energy efficiency in historic buildings should be increased by means of awareness-raising activities. On the economic level, the site had some interesting sustainable assets. Firstly, there were some major employers, and secondly, the site had a strategic function for local tourism.

The threats revealed by the analysis were that a heritage bias may inhibit innovation in the field of energetic sustainability. In addition, the ageing residents' profile of the inhabitants of this site was a problem. On average, the inhabitants were between 45–70 years old, and there were almost no young families who lived in this area.

#### 5.4. Conclusion Case Study

The quick scan revealed that for the future, it is clear that the social pillar has an important task in the evaluation of the management of heritage sites, in relationship with sustainable development. Opportunities include local heritage participation, acting as local barometer, identifying the core problems of sustainability, enabling heritage to be an essential part of the sustainable development debate, and the link with the UNESCO policy. Threats lie in the lack of local support through a top-down approach, and the time-consuming procedure that discourages uptake.

Research of Vandevyvere showed that in a non-heritage context, energy, land use, and mobility were the most important factors that made a site sustainable, followed by the indicators: process quality and participation. However, in our research the conclusion is that sustainability of heritage sites, more than in other situations, is related with a broad social consensus.

### 6. Conclusions

A major strength of this study is that for the first time, a holistic evaluation tool was created with a robust base, both on a theoretical and practical level which addressed the subjectivity of SD. The sporadic inclusion of general indicators, in addition to very specific indicators and sub-indicators, introduces more flexibility for contextual assessment. This is a methodological asset. Sustainability is an anthropocentric and dynamic concept, which reflects the expectations and values of a group of people, and that also involves a learning process. Our vision on the factors that contribute to the effectiveness and efficiency of SD, will also change as we will be increasingly able to assess the effects of a sustainability policy. Bell and Morse concluded in their research on the measurability of SD highlighting that “Like the term environment, but far more so, sustainability is what we want it to be and can change as we change. It is an organic and evolving construct of our mind and not an inorganic and static entity that can be physically probed. Indeed, the very action of trying to implement what one thinks is sustainability, may change one’s vision of what it is. The best we can achieve is to acknowledge the centrality of people . . . ” [31] (p. 200).

This research, also has the merit of integrating heritage into the broad public debate, which should be seen as an opportunity to highlight the undeniable contribution of heritage to SD. In other words, SD offers new opportunities to heritage in order to prove its added value for the society.

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### References

1. Avrami, E. Sustainability and the Built Environment: Forging a Role for Heritage Conservation. *Conserv. Perspect. GCI Newsl.* **2011**, *26*, 4–9.
2. Report of the World Commission on Environment and Development Transmitted to the General Assembly as an Annex to document A/42/427—Development and International Cooperation: Our Common Future. Chapter 2: Towards Sustainable Development. 1987. Available online: <http://www.un-documents.net/ocf-02.htm> (accessed on 15 March 2018).

3. Throsby, D. Sustainability in the Conservation of the Built Environment: An Economist's Perspective. In *Managing Change: Sustainable Approaches to the Conservation of the Built Environment*; Teutonico, J.M., Matero, F.F., Eds.; Getty Conservation Institute: Los Angeles, CA, USA, 2003; pp. 3–10, ISBN 0-89236-692-3.
4. *Convention for the Protection of the Architectural Heritage in Europe, (Granada Convention, 3 October 1985)*; CETS No. 121; The Council of Europe: Strasbourg, Germany, 1985; Available online: <http://conventions.coe.int/Treaty/en/Treaties/Html/121.htm> (accessed on 15 March 2018).
5. ICOMOS. *Charter for the Conservation of Historic Towns and Urban Areas*; Washington Charter 1987; ICOMOS General Assembly: Washington, DC, USA, 1987. Available online: [http://www.international.icomos.org/charters/towns\\_e.pdf](http://www.international.icomos.org/charters/towns_e.pdf) (accessed on 15 March 2018).
6. Lombardi, P.; Brandon, P. *Evaluating Sustainable Development in the Built Environment*; Blackwell: Oxford, UK, 2010; ISBN 978-1-405-19258-3.
7. Lombardi, P. Understanding Sustainability in the Built Environment. A Framework for Evaluation in Urban Planning and Design. Ph.D. Thesis, University of Salford, Salford, UK, 1999.
8. UNESCO. Recommendation on the Historic Urban Landscape (10 November 2011) 2011. Available online: [http://portal.unesco.org/en/ev.php-URL\\_ID=48857&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=48857&URL_DO=DO_TOPIC&URL_SECTION=201.html) (accessed on 6 July 2018).
9. Vandevyvere, H. Strategieën Voor een Verhoogde Implementatie van Duurzaam Bouwen in Vlaanderen. Toepassing op Het Schaalniveau van Het Stadsfragment. Ph.D. Thesis, KU Leuven, Leuven, Belgium, 2010.
10. Dooyeweerd, H. *De Wijsbegeerte van de Wetsidee. Boek I. De Wetsidee als Grondlegging der Wijsbegeerte*; H.J. Paris: Amsterdam, The Netherlands, 1935. Available online: [http://www.dbnl.org/tekst/dooy002wijs01\\_01/colofon.php](http://www.dbnl.org/tekst/dooy002wijs01_01/colofon.php) (accessed on 15 March 2018).
11. Bossel, H. *Indicators for Sustainable Development: Theory, Methods, Applications. A Report to the Balaton Group*; International Institute for Sustainable Development: Winnipeg, MB, Canada, 1999; ISBN 13 978-1895536133.
12. Rotmans, J.; de Vries, H. *Indicators for Sustainable Development. Perspectives on Global Change: The TARGETS Approach*; University Press: Cambridge, UK, 1997; ISBN 0-52162-176-3.
13. Nusselder, E.J.; van de Ven, H.; Haas, M.; Dulski, B. *Handboek Duurzame Monumentenzorg. Theorie en Praktijk van Duurzaam Monumentenbeheer*; SBR: Rotterdam, The Netherlands, 2011.
14. Stubbs, M. Heritage-Sustainability: Developing a Methodology for the Sustainable Appraisal of the Historic Environment. *Plan. Pract. Res.* **2004**, *19*, 285–305. [CrossRef]
15. Clark, K. Only Connect—Sustainable Development and Cultural Heritage. In *The Heritage Reader*; Fairclough, G., Harrison, R., Jameson, J.H., Jr., Schofield, J., Eds.; Routledge: London, UK; New York, NY, USA, 2010; pp. 82–98.
16. English Heritage. Sustaining the Historic Environment. New perspectives on the future. In *The Heritage Reader*; Fairclough, G., Harrison, R., Jameson, J.H., Jr., Schofield, J., Eds.; Routledge: London, UK; New York, NY, USA, 2010; pp. 311–321.
17. Clark, W.; Mitchell, R.; Cash, D.; Alcock, F. *Information as Influence: How Institutions Mediate the Impact of Scientific Assessments on Global Environmental Affairs*; Faculty Research Working Papers Series; John F. Kennedy School of Government, Harvard University: Harvard, MA, USA, 2002.
18. Parris, T.; Kates, R. Characterizing and Measuring Sustainable Development. *Annu. Rev. Environ. Resour.* **2003**, *28*, 1–28. [CrossRef]
19. Beco, M. L'expertise Comme Influence: Impact de Systèmes D'indicateurs Environnementaux sur la Prise de Décision Politique en Matière D'environnement. Master's Thesis, Université Libre de Bruxelles, Bruxelles, Belgium, 2006.
20. Ciegis, R.; Ramanauskiene, J.; Startiene, G. Theoretical Reasoning of the Use of Indicators and Indices for Sustainable Development Assessment. *Eng. Econ.* **2009**, *3*, 33–40.
21. Hardi, P.; Zdan, T. (Eds.) *Assessing Sustainable Development; Principles in Practice*; International Institute for Development: Winnipeg, MB, Canada, 2009; ISBN 1-895536-07-3.
22. Valentin, A.; Spangenberg, J. A guide to community sustainability indicators. *Environ. Impact Assess. Rev.* **2000**, *20*, 381–392. [CrossRef]
23. Alfonzo, M. To Walk or Not to Walk? The hierarchy of walking needs. *Environ. Behav.* **2005**, *37*, 808–836. [CrossRef]
24. Luten, I.; Lopez, M.; Woldendorp, T.; Van Zwam, C. *Handboek Veilig Ontwerp en Beheer*; Uitgeverij THOTH: Bussem, The Netherlands, 2008.

25. Vernimme, N. *Energiezuinig Leven in Woningen met Erfgoedwaarde*; Agentschap Onroerend Erfgoed: Brussels, Belgium, 2013.
26. ICOMOS. *The Venice Charter: International Charter for the Conservation and Restoration of Monuments and Sites*; ICOMOS: Paris, France, 1964; (revised 2004). Available online: <http://www.icomos.org/venicecharter2004/dutch.pdf> (accessed on 15 March 2018).
27. ICOMOS. *Firenze Charter on Historic Gardens*; ICOMOS: Paris, France, 1982. Available online: [http://www.international.icomos.org/charters/gardens\\_e.pdf](http://www.international.icomos.org/charters/gardens_e.pdf) (accessed on 15 March 2018).
28. ICOMOS. *Quebec Declaration on the Preservation of the Spirit of Place*; ICOMOS: Paris, France, 2008. Available online: [http://www.international.icomos.org/quebec2008/quebec\\_declaration/pdf/GA16\\_Quebec\\_Declaration\\_Final\\_EN.pdf](http://www.international.icomos.org/quebec2008/quebec_declaration/pdf/GA16_Quebec_Declaration_Final_EN.pdf) (accessed on 15 March 2018).
29. Australia ICOMOS. *Australia ICOMOS Charter for Places of Cultural Significance*; (The Burra Charter), Pamphlet. Australia ICOMOS Inc.: Burwood, Australia, 2013. Available online: <http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf> (accessed on 15 March 2018).
30. Agentschap Onroerend Erfgoed. Begijnhof [online], Tijl Vereenooghe. 2018. Available online: <https://id.erfgoed.net/erfgoedobjecten/122155> (accessed on 6 July 2018).
31. Bell, S.; Morse, S. *Sustainability Indicators—Measuring the Immeasurable?* Earthscan: London, UK, 2010; ISBN-13 978-1-84407-299-6.



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