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Mediterranean Architecture and the Green-Digital Transition

Selected Papers from the World Renewable Energy Congress Med Green Forum 2022

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Contents

Sustainable Real Estate Development: How to Measure the Level of Introduced Sustainability?

Alice Paola Pomè, Andrea Ciaramella, and Leopoldo Sdino

1 Introduction

The growing interest in sustainable development has resulted in a parallel growth in sustainable measurements. Sustainability indices and ratings are used to measure the sustainability performance of countries (such as EIRIS), companies (such as GRESB) or products and activities (such as LEED in the construction sector) [1]. The concept of sustainable development is traced back to the report "Our Common Future" [2], which first defined the concept and the mission. The United Nations have improved the first declaration of sustainable development through several acts and have reached a specific document in 2015, namely "Transforming our World: The 2030 Agenda for Sustainable Development" [3]. The Agenda 2030 is a framework of 17 goals that have the general objective to guide nations through more sustainable economic growth [3]. The goals, called Sustainable Development Goals (SDGs), are specified through 169 targets, that refer to the 5 P's of sustainability: people, planet, prosperity, peace, and partnership. SDGs have become referring points not only for governments, which have a general perspective of sustainable issues, but also for companies and businesses [4]. Sustainability principles have pushed customers, investors, and business partners to ask companies for higher transparency in showing the environmental, social, and economic effects of their activities [5]. However, the integration of sustainability issues into investment decisions requires data availability, metrics and a well-implemented methodology that allow managers, investors, and customers to monitor impact.

In this context, the real estate sector, part of the Architecture, Built Environment, Construction and Operation (AECO) industry, can play a central role in

A. P. Pomè (✉) · A. Ciaramella · L. Sdino
Politecnico di Milano, Milan, Italy
e-mail: alicepaola.pome@polimi.it; andrea.ciaramella@polimi.it; leopoldo.sdino@polimi.it

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implementing sustainable development. Indeed, the AECO industry is responsible for very high environmental degradation [6]. According to the AECO industry's consumption (about 40% of the total economy's material and energy) and emissions (about 50% of the total economy's greenhouse gas emissions), the introduction of frameworks to reduce the impact has become crucial [7]. The real estate sector generates effects on the society and on the economic market by implementing social infrastructures, generating income, and promoting private investments. Indeed, the real estate is responsible for developing projects for housing, schools, hospitals, and community centers [8]; for involving in the development process several stakeholders, that need metrics to assess the social, environmental, and economic impact of the projects; for generating high levels of employment, as around 110 million workers are working in this sector worldwide [9]; and, for creating from 50% to 70% global wealth in the past 10 years [10]. Moreover, the built environment, developed and managed by real estate, represents the place in which people spent most of their life. The Organization for Economic Cooperation and Development reported that people on average spend more than 90% of their time indoors [11]. These numbers show the importance of developing healthy and safe buildings, well integrated into the environment, and with an optimized economic impact [8]. Therefore, more and more investors in the real estate rely on some indicators that aim to measure the sustainable risks of the investment [12]. Applying sustainability in the real estate means to increase the efficiency and effectiveness of the built environment [13] by making buildings adaptable with the changes of users' needs over time [14]. Buildings have become complex environment that need to manage environmental, social, and governance issues. So, the multiplicity of tools used to certificate the sustainability performance of buildings has become ineffectual to guide investors and managers through more sustainable strategies. The real estate sector has recently brought from the financial sector a new set of factors, namely ESG (Environmental, Social, and Governance), with the purpose to improve the sustainability of real estate investments and operations.

The present research aims to elaborate on the ESG factors and their application in the real estate market. The objective is to implement an ESG framework to evaluate and compare the effects of different investment decisions on real estate operations.

First, after underling the context of sustainable real estate operations, and analysing the state-of-the-art in the application of ESG, the present research concentrates on the definition of the framework. This is made of 52 indicators, divided into nine clusters (Site, Territory, Services, Materials – Technologies, Energy – Emissions, Water, Well-being, Social – Economic, and Governance).

Second, a weights matrix of the indicators is defined. The Analytic Hierarchy Process (AHP) is chosen to implement the weights matrix due to its usability to disentangle complex issues into little steps, and its ability to measure and compare qualitative and quantitative performances.

Finally, the framework is discussed in the conclusion, and some potential improvements are presented.

2 ESG in the Real Estate Industry

The Environmental, Social, and Governance factors (ESGs) reached fast the interest in both the real estate market and the academia. These factors demonstrated the increased investors' concern in the non-financial performance of firms, products, and operations [15]. The United Nations-supported Principles for Responsible Investing (UN-PRI) started promoting the inclusion of ESG in the investment decisions since 2018 [16]. UN-PRI established a standard for evaluating companies of all markets to measure their sustainability performance, divided into three categories, namely Environmental to assess the company's impact on climate change, waste, and pollution; Social to assess the company's impact on working conditions, local communities, and health; and, Governance to assess the company's impact on tax strategy, executive pay, and corruption [16]. UN-PRI evaluate the ESG factors by industry rating agencies and gives different weights to specific indicators according to the industry. As presented by UN-PRI, ESG factors represent a tool for evaluating the long-term impact of investment opportunities [17].

The ESG implementation in the real estate offers a practical and transparent way to connect progress on sustainable initiatives to the estimation of long-term impact. The study conducted by Larsen [17] shows that real estate operators are leveraging their sustainability initiatives to attract more tenants, reduce operating expenses, and improve investment programs. On the other hand, investors are looking not only at financial effects but also at environmental and ethical concerns [18]. Even if a lot of rumours on ESG factors in the real estate market, the effects of more sustainable investments have received little attention. However, those studies that focused on the relationship between profit and sustainable issues (especially, social, and environmental) have shown a positive correlation for this market [19]. This correlation is nowadays trying to be assessed through the ESG factors, which aim to measure the direct and indirect impacts of activities, assets, or companies [20]. ESG refers to the central effects that measure sustainable impact [6]. The capital market, which has the aim to commit to net zero portfolios, is incorporating ESG to make investment decisions [20]. According to Deutsche Bank (2021), 95% of all investments will consider ESG factors by 2035. Real estate represents a key market for the global economy, and the global cost of environmental transition is about € 6.35 trillion per year [21]. Eichholtz et al. [22] documented a link between the real estate market and the energy efficiency of properties. This link suggests a positive correlation between the "greenness" of the portfolio, assessed through green certifications (such as LEED), and the operating performance of the investment [22].

2.1 Regulatory Framework

The European Green Deal aims to make Europe the first climate-neutral continent by 2050 [23]. Throughout the "Action Plan Financing Sustainable Growth" [24], the European Union proposes a 10-point plan with the objective to reorient capital flows

towards sustainable investments, integrating sustainability into risk management and promoting transparency and encouraging a long-term vision. To mitigate the environmental issues caused by the AECO operations, the European Union has issued several legislative frameworks, such as the Directive on the energy performance of buildings (2010/31/EU), and the Directive on the construction phase of buildings (2012/27/EU). These directives frameworks issued by the European Union since the beginning of the new millennium had the focus on reducing the energetic expenditures of buildings [25]. Thus, the main requirement of these directives was to ask the Member States to build nearly zero-energy buildings from 2020 onward [26]. In July 2021, European Union enacted a proposed revision of the Energy Efficiency Directive with the objective to reduce the greenhouse gas emissions to at least 55% below 1990 by 2030 (the Climate Target Plan), and to reach the zero-emission building stock by 2050 [27]. Although the work of the European Commission, the European building stock is far from being sustainable [28], as estimations highlight that only 25% of the existing European building stock complies with the current standards [29]. Moreover, the adoption of sustainable policies in building interventions means going further in the energy aspect by including social and economic implications [30]. These directives, firstly implemented in the construction phase for solving environmental issues, were then adopted in the management phase for measuring the sustainable (adding also economic and social issues) impact of real estate investment and operations [31]. In 2014 the European Union issued three different directives for the real estate sector. Directive 2014/23 focused on the award of concessions for works and services, which governs concessions for public works. Directive 2014/24 established new rules on the procedures for procurement by public contracting authorities, relating to public works and design competitions. Finally, directive 2014/25 established the new minimum reporting standards on environmental and social matters, in relation to personal management, respect for human rights and the fight against active and passive corruption.

As reported in the state of the art, the integration of ESG factors into the investment evaluation process means highlighting the risks and the opportunities of parameters not exclusively focused on financial aspects, but also look at environmental, social, and governance ones. Although there is no specific regulatory framework for the integration of ESG factors in the real estate sector, it may be useful to recall the 20-20-20 package, which had set in 2008 to reduce by 20% greenhouse gas emissions, bring energy savings to 20% and increase the consumption of renewable sources by 20% by 2020. After 2008, the European Commission has established the “Green Deal” in 2019 [23], which reports a detailed action plan with the objective of renovating and improving the efficiency of buildings. So, the European Commission is working on five major aspects:

1. The Sustainable Finance Disclosure Regulation (SFDR) establishes rules for classifying and reporting on sustainability and ESG factors in investments. SFDR was developed to improve transparency, with the main goal of preventing greenwashing, as well as to direct capital towards more sustainable investments/products and businesses;

2. Regulation 2020/852/EU (18th June 2020), namely the Taxonomy Regulation which establishes the birth of the first system in the world for the classification of sustainable economic activities, establishing the criteria for determining whether an economic activity can be considered environmentally sustainable. The Taxonomy identifies six environmental and climate objectives to be respected: (1) Mitigation of climate change; (2) Adaptation to climate change; (3) Sustainable use and protection of water and marine resources; (4) transition to the circular economy, also with reference to waste reduction and recycling; (5) Pollution prevention and control; and (6) Protection of biodiversity and ecosystem health.
3. The Delegated Regulations 2020/1816/EU and 2020/1817/EU concerning respectively the "Climate Transition" and "EU Paris-aligned Benchmark", with the aim to reduce the carbon footprint of a standard investment portfolio in the context of the Paris Agreement they aim to select only the elements that contribute to the achievement of the 2 °C target established as the maximum increase in the earth's average temperature.
4. The "Shareholder Rights Directive II" (SRD II) is a directive on shareholders' rights issued to involve shareholders and increase the level of companies' transparency.

At the Italian level, however, it is necessary to consider Legislative Decree 254/2016, which refers to the European Commission Directive 95/2014 and expresses itself on the subject of "communication of non-financial information and information on diversity by certain companies and certain groups of large companies" (Gazzettaufficiale.it 2017). This Decree aims to provide integrated and complementary information with respect to what a company reports in the annual financial statement. Then, in 2017, the Italian parliament issued the Minimum Environmental Criteria (Criteri Ambientali Minimi – CAM) to introduce the minimum requirements to be met for interior furnishings, buildings, and textile products in terms of energy efficiency, acoustic comfort, and sustainability of the materials used. The purpose of the CAMs was to achieve the objectives set out in the action plan for the environmental sustainability of public administration consumption and the promotion of sustainable production and consumption and circular economy models. As regards energy efficiency specifically, the CAMs refer to the indicators defined in the Ministerial Decree of 26 June 2015. While looking at the issue of environmental sustainability of materials and products, these must meet certain criteria relating to the percentage of recycled materials.

2.2 Framework for Assessing Sustainable Development in the Real Estate

The link between the real estate sector and the ESG factors has been pointed out not only by the academia environment but also by the market and the European Commission. This relevance led to the implementation of frameworks that use ESG factors for evaluating the real estate sector. The most used frameworks are

compared in Table 1. A substantial difference emerges in the structure and purpose of the single framework. For example, the Agenda 2030 [3] system is a general guideline, focused on achieving an objective without reporting technical references for calculating the impacts; while the SASB system [32] is a technical and implementation guideline, focused on technical references for the calculation.

Table 1 Comparison between the most used frameworks for the sustainability evaluation of the real estate sector – elaboration by the authors

Framework	Description	Sector	Structure	Supporting	ESG focus
Agenda 2030 (SDGs)	Larger framework, consisting of 17 goals (the Sustainable Development Goals – SDGs) and 169 implementation targets. The system, adopted for a wide range of materials and sectors, aims to increase the attention to sustainable development matters	All	Goals & targets	International & national policies	E + S + G
GRI	The Global Reporting Initiative (GRI) is a tool that aims to assess the sustainability impacts of organizations. GRI has defined a series of "reporting standards" (including real estate) that allow organizations to identify and compare their own impacts on ESG	Real Estate	Hierarchical table	Framework for organizations	E + S + G
SASB	The Sustainable Accounting Standards Board (SASB) aims to define a series of standards to guide organizations towards sustainable development. The specific framework for real estate investigates four main issues, namely Energy Management, Water Management, Management of Tenant Sustainability Impact and Climate Change Adaptation	Real Estate	Hierarchical table	Framework for organizations	E
GRESB	GRESB measures the ESG performance of individual real estate assets and portfolios based on self-reported data from companies. GRESB integrates other energy, green or sustainability certification systems into its assessment to improve the transparency of the assessment processes and create a system that allows comparison	Real Estate	Descriptive guide	Framework for organizations	E

(continued)

Table 1 (continued)

Framework	Description	Sector	Structure	Supporting	ESG focus
ICMS	The International Cost Management Standards is an international standard that aims to improve design and construction processes by considering comparable and consistent data at international level that look not only at economic costs but also environmental ones	Real Estate	Hierarchical table	Framework for organizations	E
B Corp	B Corporation is a system that measures the sustainability performance of companies, evaluating the impacts of four categories, namely Community, Environment, Workers, Government and Costumers	All	Survey	Framework for organizations	E + S + G

Generally, all the analyzed frameworks started from the 17 goals of the Agenda 2030 [3], which represents generic guidelines on sustainable development. The most relevant objective for the real estate sector is goal 11 "Sustainable cities and communities", which asks to "create inclusive, safe, resistant and sustainable cities and human settlements". Even if some targets specify the actions to take for implementing goal 11, the Agenda 2020 represents a strategic guideline that must be implemented by specific legislation. Therefore, several national and international bodies start reasoning on more specific frameworks, such as GRI [33], SASB [32], GRESB [34], ICMS [35], and B Corporation [36]. Among these frameworks, the most used in the real estate sector is the Global Real Estate Sustainability Benchmark (GRESB). GRESB is a commercial real estate reporting tool for giving environmental social, and governance data on real estate portfolios [34]. GRESB has be implemented in 2009 by pension managers that noticed the lack of the real estate sector in measuring the ESG impact of real estate portfolios. A review of GRESB shows that even if the framework reports very well where the real estate stands on sustainable development, it fails in showing environmental and social impact [8]. The majority of the ESG factors evaluate the governance impact by concentrating on the organizational level, such as board governance, company policy, and employee satisfaction, while few indicators evaluate the sustainable level of products and services [8]. This analysis demonstrated that the sustainability impact created by the sector should be evaluated at a product level, as real estate is based on physically developing products with which humans interact [8].

2.3 State-of-the-Art Outcomes

What emerges from the state-of-the-art is that the real estate sector needs to understand how each decision in the built environment is impacting environmental, social, and governance issues. This evaluation should measure all real estate investments not only for showing investors the ESG impact but also for suggesting to developers and stakeholders the sustainable directions to perform during the design and construction phases. Therefore, the present research reasons the ESG to implement a new framework for evaluating the sustainability performance of real estate investing developments.

3 Methodology

After the analysis of the state-of-the-art on the application of ESG in real estate, the present research concentrated on the development of a framework for the evaluation of the sustainability performance of real estate investments. The comparison of the previous frameworks has been used to implement the structure of the new ESG framework. Then, the research is developed into two major steps:

1. Implementation of the Matrix of indicators; and
2. Development of the Matrix of weights.

The first step, Implementation, has been developed thanks to the comparison between the previous ESG frameworks. While for the second step, Development, a specific decision-making model has been chosen. For this step, an experimentation test has been conducted throughout 17 expertize in real estate. Finally, the conclusions report some potential strengths of the framework and some future developments that the authors intend to implement.

4 Matrix of Indicators

The analysis of the state-of-the-art and the comparison of previous frameworks has demonstrated the benefit of identifying individual indicators to show the sustainability performance of operations. Therefore, the research has identified an ESG system for the sustainable evaluation of the real estate development process. The system consists of 52 indicators, divided into 9 categories (Fig. 1).

These 9 categories have been identified as the collectors of the most relevant elements for the evaluation of the sustainability performance of real estate development processes. Thus, “Site” and “Territory” identify the lot to which the real estate development process belongs; “Services” shows the interactions that the site has with the neighbourhood and its services; “Materials – Technologies”, “Energy and

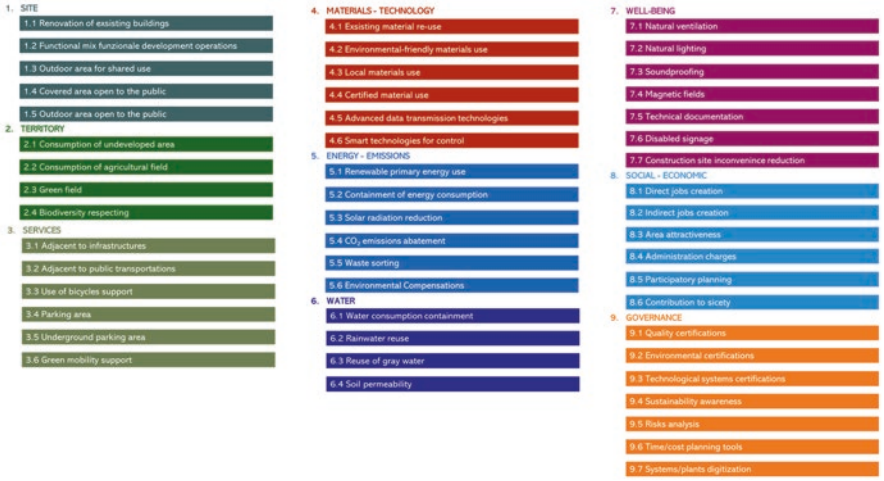

Fig. 1 The 9 categories and the 52 indicators of the Matrix of indicators – elaboration of the authors

Emissions", "Water", and "Well-being" identify the construction characteristics of the building and the effects that design choices have on users' comfort; and, "Social – Economic" and "Governance" show the effects that the real estate investment generates on users and on all society, which also indirectly is impacted by the real estate development. The state-of-the-art has also highlighted the importance of correlating the indicators with the SDGs to specify the actions to be taken for integrating sustainable development into real estate development projects. This correlation allows to identify the long-term impact of the real estate development project on sustainable development. Moreover, to highlight the sustainability performance of the project and the impact of the management and territorial development of the real estate investment, the framework needs to show the ESG intention of each indicator. ESG investment reflects the desire to invest in companies (or, projects) that seek to solve social and environmental problems by practicing solid corporate governance of the real estate development process. Finally, the framework needs to highlight the territorial effects of the real estate development process by defining for each indicator the territorial scale impact. Therefore, as shown in Fig. 2, the Matrix of indicators reports:

- On the columns up the 52 indicators, are divided into the 9 categories;
- On the raws the 17 SDGs: the sustainability performance of the real estate development project; and.
- On the columns down the ESG intention of the real estate investment (E, E-S, E-G, S, S-G, G, or E-S-G) and the generated territorial effects (local, regional, or global).

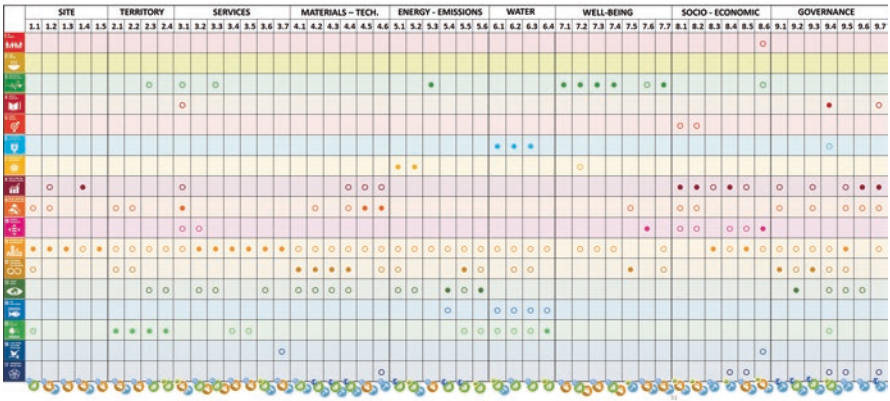

Fig. 2 The Matrix of indicators – elaboration of the authors

5 Matrix of Weights

After the implementation of the structure, the authors have evaluated the indicators by developing a weights matrix. Each real estate project has limited resources, and these must be distributed over a range of parameters in the decision-making and subsequently executive phase. The risk is not correctly considering the cost of the lost opportunity in distributing resources in a non-optimal way or more simply not providing proper attention to an issue that could subsequently prove to be fundamental or critical. The use of a system of weights to be applied to each indicator is necessary to implement the decision-making process by concentrating resources on the most critical issues. The weight system improves awareness of the importance of a particular indicator with respect to the total and the impact it generates at the ESG level.

To identify which indicators, have the greatest impact on the sustainability performance of the real estate investment, the authors used the Analytic Hierarchy Process (AHP). AHP, developed by T.L. Saaty in 1980 [37], is a decision-making tool that uses the principle of hierarchic composition to derive priorities of alternatives with respect to multiple criteria [37]. AHP is one of the most used methodologies to legitimize the decision-making process of multiple criteria which is based on the definition of a hierarchy of importance among the different elements under analysis. The main advantage of the AHP methodology is the flexibility with which it can be adapted to various applications [38]. It has been used in various areas, including planning, best alternatives selection, resource allocation, and process optimization. The AHP methodology is based on the so-called Saaty Scale [37], which provides a score from 1/9 to 9. "1/9" expresses the extreme prevalence in terms of the importance of the element placed on the column compared to the one placed on the line. While "9" indicates the extreme prevalence of the element placed on the row compared to that placed on the column. All the numbers between these two extremes form a scale with an increasingly lower relative prevalence between the two indicators.

In order to define the hierarchy importance of the 52 indicators, the authors have defined a sample of seventeen experts in the real estate field, including academia researchers, facility managers, and professionals. The compilation of the sample is the most critical step of the AHP. Indeed, in the compilation of the evaluation form, the sample may make mistakes in two orders. The first possible mistake is the lack of congruence in the comparison of the indicators, while the second is the lack of congruence in the weight attributed to the indicators. So, for example, let's take a matrix with three indicators (A, B and C). The first possible mistake is to evaluate A > B, B > C, but then C > A. In this case the indicator A must be evaluated as more important than C. The second error, however, is to evaluate A >> B; B >> C, but then A > C. In this, the indicator A, much more important than B, which turns out to be much more important than C, must be evaluated as much more important than C (A >> C). To overcome these errors, the standardization method is applied in the present research, which provides for an imposed consistency index of 10% [37]. This index, if exceeded, forces a revision in the compilation of the evaluation format. Furthermore, to support the respondents in their compilation, the present research has developed an evaluation format that provides for the compilation of only the upper part of the diagonal where "FILL IN" is reported, see Fig. 3. Then, once the upper half of the table has been filled in, the lower one will already be calculated, representing the inverse of the weights assigned in the upper half. An eigenvector is then calculated for each individual indicator, which is divided by the total eigenvector allows to obtain the percentage weight of an indicator with respect to the total.

The sample of seventeen experts filled in the evaluation format individually, after an introduction by the authors that defined each indicator. The obtained results were compared, obtaining a minimum, a maximum, and an average of the weights in percentage (Fig. 4). The average percentage weight represents the weight to be applied to evaluate each indicator defined within the designed framework.

From the average results, category "8. Social-Economic" seems to greater impact (16.90%) on the sustainability performance of real estate investments. Within this category, the most significant indicator is "8.1 Direct jobs" (39.13%), followed by "8.2 Indirect jobs" (27.54%), while the least impacting "8.4 Administration charges "(2.68%). The category "8. Social – Economic "is followed by the category "7.

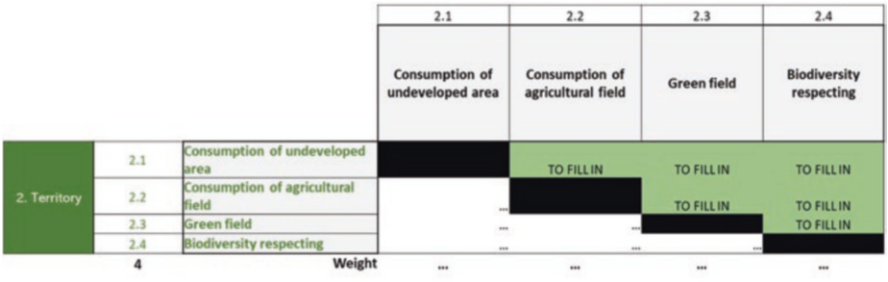

Fig. 3 Evaluation format for the Matrix of weights – elaboration of the authors

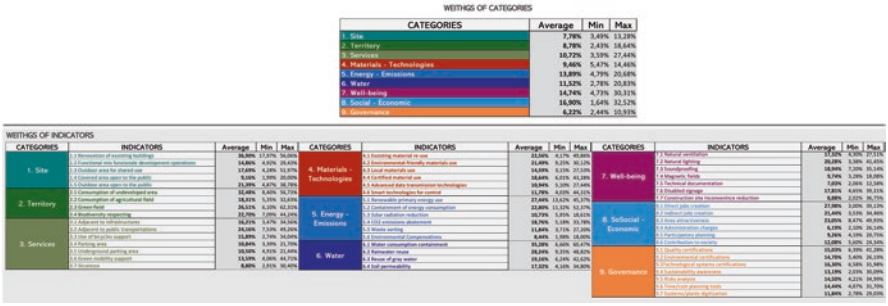

Fig. 4 The Matrix of weights – elaboration of the authors

Well-being“(14.74%), in which the most significant indicator is “7.3 Acoustic insulation“(25.98%), followed by “7.4 Disabled signs” (23.35%). While the category that according to the sample of experts has the least impact on the sustainability performance of real estate investments is “9. Governance” (6.22%), in which the least impacting indicator is “9.7 Digitalization of systems and plants” (2.78%).

6 Conclusion

This research represents a first step into the implementation of the ESG framework for evaluating the impact – and the best options – of a real estate development investment. The experimental step of the present research highlights the importance of including social, economic, and governance indicators in the evaluation of the sustainability performance of real estate development investment. This confirms also what has emerged in the state-of-the-art. Although the relevance of the matter, the research presents some limitations. First, the framework has not been tested on a case study yet. This prevents the authors to test the reliability of the framework. Second, the weights have been evaluated only by a sample of real estate experts. To improve the quality of the “Matrix of weights”, future developments of the framework should test the sustainability importance hierarchy of indicators and categories by different categories of samples, such as potential users, and private investors. This step would assess the effectiveness of the ESG framework. However, the research has examined hot topics for real estate and proved that sustainability principles have pushed real estate operators to assess the overall sustainability impact of investments. Therefore, a framework that improves the level of transparency of real estate development projects is relevant to mitigate the overall sustainability impact of the real estate sector. Finally, the present ESG framework represents an improvement of the previous frameworks because it lists together all the indicators that impact the sustainability performance of a real estate development project, and highlights the correlation between indicators, SDGs, ESG intention, and territorial effects.

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Index

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