Producing Project

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1.14 RATING SYSTEM AS DESIGN TOOL TO MANAGE COMPLEXITY

Lia Marchi[*]

Abstract

During the last decades the way we have managed the built environment has deeply changed. New factors of indeterminacy and unpredictability have been introduced due to the economic and environmental crisis, and the harshening of particular social issues. Thus, new designing approaches have become necessary. In this framework, sustainability building Rating Systems (RS) have gradually spread as design tools. In some cases, they specifically incorporate principles of resilience to cope with criticalities of the built environment, both acute and chronic. On this basis, the paper proposes the formulation of a RS to increase the resilience of industrial sites, a key asset in the management of territory. Hence, the project becomes an open protocol, flexible and adaptable on a case-by-case basis.

Keywords: Uncertainty, Unpredictability, Resilience, Rating System, Industrial facilities

Introduction

Changes in the socio-cultural, economic and environmental dynamics of athropized systems that have occurred during the last decades called for a deep reflection about operating methods and roles of actors involved in the management and transformation of the built environment.

The lasting of economic crisis, the increasingly frequent natural catastrophes, the augmented vulnerability of large social groups (Saporiti et al., 2012), the intensification of migration and the changed paradigms in living and manufacturing are just some of the factors that increase indeterminacy and unpredictability both in people habits and in functioning of settlements. Thus, in recent years the built environment has been more and more in need of providing resilient solutions to change (Burroughs, 2017)[1].

In this framework, the traditional "cause-response" design approach often resulted to be inadequate in effectively tackling acute events (e.g. earthquakes, floods) or long-term changes (e.g. new types of families).

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[1] According to Burroughs resiliency in design is a necessary approach to manage the uncertainty state of current heritage.

Hence, many studies on resilience at the building scale have been undertaken, in particular addressed to extreme and rapid changes (Heidrich, 2017).

Beyond, also new patterns of requirements, economic constraints and a renewed social interest for common goods have promoted fruitful reflections on the role of actors and on the practices to be adopted in the building sector. As a result, new design approaches have been proposed. In many cases they are based on theories formulated since the Seventies, among which: the project that becomes a process, more and more open to the biography or narration of the context (De Carlo, 1973), and the project as a composition of patterns already in nuce in the site (Alexander, 1977). Therefore, there has been a shift to these open methodologies – both in terms of content and operations: here, the role of architects is increasingly measured as the ability to "design the process".

I Rating System come strumenti progettuali

In this framework, a new group of tools for the management of the built environment emerged: the multi-criteria systems for the assessment of building sustainability or Rating Systems (RSs). Although originally designed for different purposes, RSs are also useful tools to guiding the project, as they provide a structured procedure to map needs and their mutual relations.

These tools are based on a robust analysis of the intervention context, which aims at identifying its factors of strength and weakness. On this basis, matrixes of corrective actions are formulated, deeply rooted in the place observation. Their multi-criteria structure makes RS suitable tools to balance the multi-faceted issues of a project: these systems can act on a case-by-case basis seeking for the "best compromise", that is a key concept of resilience.

As a result, overcoming the concept of mere assessing means, some RSs have recently been developed by implementing resilience objectives and serving as guide to designers. REDi[2] (Almufti, Willford, 2013) and RELi[3] (Wholey, 2015) are two important references for this new family of methods. The importance of the issue is also highlighted by the attempt to integrate principles of resilience into the most common international RSs, such as LEED (Wilson, 2015). In parallel, similar specific experiments are spreading in literature (Re Cecconi, 2018; Burroughs, 2017). While the LEED extension integrates the existing scheme with three new pilot credits, REDi and RELi are entirely built to endorse requirements of resilience. These latter adopt a holistic approach for all the evaluation categories, with the aim of achieving buildings which can optimally and effectively adapt to whatever change (acute or chronic).

2 The Resilience-based Design Initiative has been developed by ARUP.

3 The protocol has been developed by Perkins+Will in partnership with The University of Minnesota.

Among the novelties introduced by these tools, one is particularly related to resilience and it is specifically clarified in RELi[4]. The design process is iterative: after choosing the project strategies, the design team is invited to quickly prototype the project and to test it several times through the RS. Each subsequent application of the protocol reveals missed opportunities and critical issues not yet addressed, which are corrected step by step. This produces a progressive refinement of the design, up to reach the highest level of resilience achievable for the case.

Industrial sites, a complex asset

In this context, the paper proposes an experimental application [5] of the principles of these new RSs to manufacturing places, a heritage often neglected by territorial management policies, but fundamental to increase the resilience of the built environment. As a matter of fact, industrial sites are among the main responsible of anthropological impact on the environment. Interference with the landscape[6] involves the physical dimension, through a series of heavy effects on the main ecosystem matrices (soil, water, air, material resources, etc.). In addition, also the aesthetic-perceptual sphere is involved, as industries generate intense contrasts with the scenery, often without mitigation (Busquets, Fabregas, 2007). Production buildings are frequently perceived as detractors of the landscape (Cassatella, Gambino, 2013) and provoke diffuse social disturbances. Since the Eighties, the attention of researchers and policy makers for the environmental compatibility of industry has been growing. Gradually, the morphological and aesthetic-perceptual quality of buildings have also been addressed.

However, it still lacks a unitary reflection where the multiple connotations of the topic are combined together: that is, mitigating the impacts that occur at different scales with needs of manufacturing processes.

Therefore, the research general objective is to formulate strategies to mitigate the impact of industry on the landscape, both addressing existing and new buildings. Hence, an operative tool to support the design is proposed, by adopting the resilience-based RSs as reference to manage such a complex and peculiar asset.

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4 Data retrieved from the dedicated website http://c3livingdesign.org/?page_id=13783 (accessed 02 May 2018).

5 The reference is the PhD research project “Landscape compatibility of industrial plants” by Lia Marchi, XXXII Cycle of Doctorate in Architecture, University of Bologna (2016-2019). The study is supported by Orogel (FC).

6 The assumed landscape definition is the one by European Landscape Convention (2000). Accordingly, the landscape’s components are: environmental or natural; social/cultural; aesthetic-perceptual.

A Rating System for industrial facilities

To do this, a system for assessing impacts of factories on the landscape has been developed; the procedure addresses together the environmental, aesthetic-perceptual and social/economic aspects. The system is associated to a repertoire of mitigation tactics, from which the actors of the process – companies and designers – can select best practices based on the functional, expressive, economic and socio-cultural requirements which fits their project at best.

The research method is broken down into three blocks, aimed at:

- identifying a set of indicators to measure the impact of factories on the landscape and priorities interventions; then, developing a system of credits for the assessment of the impacts (Activity 1);
- collecting remarkable case-studies into a repertoire of best practices, from which extract a catalogue of mitigation tactics on the landscape (Activity 2);
- testing the protocol (the system of credits combined with the best practice repertoire) on Orogel, an agrifood company that supports the research; then developing some mitigation scenarios (Activity 3).

According to the premises, the article presents the development of the first group of activities, aimed at formulating the assessment system (RS).

The first step for developing the new RS identifies the principal impacts of industrial settlements on the landscape. A literature and sector-based analysis led to depict the overall problem, identify common practices and draw up a list of the most relevant impacts on the environmental, socio-cultural and aesthetic-perceptive components of the landscape. Then, each impact was associated with at least one indicator suitable to measure the specific effect of the industrial site on the landscape.

Afterwards, a review of the most common rating systems was made in order to select the most consistent with the research and assume it as reference. Therefore, among the more internationally widespread RSs, the ones which are specifically dedicated or applicable to industrial buildings have been selected (Tab. 1). Hence, LEED v4 BD + C: Warehouses and Distribution Centres was selected both for the highest percentage of credits corresponding to the author's list of impacts and for the greater percentage of credits potentially related to aspects of the perceptual-aesthetic (PA) sphere.

Then, the study integrates the LEED system – which originally addresses only environmental impacts – with a new thematic area referring to aesthetic-perceptual disruptions and the related socio-cultural interferences (Tab. 2).

This is possible as the LEED credits' weighing process allows integrations to the system without compromising its fundamental mechanisms: each credit gets one or more points based on its relative effectiveness to contribute to the general objective of the system; hence, it is always possible to introduce new thematic areas and/or new credits, as long as the scores are recalculated.

Rating system	Version	Specific	Adaptable
BREEAM	BREEAM International New Construction 2016		x
CASBEE	CASBEE for Buildings (New Construction) 2014**		x
DGNB	- DGNB New Industrial Buildings*	x	
	- Core 14		x
GREEN STAR	Green star - Industrial v1 2010 (up.2014)	x	
LEED India	IGBC Green Factory Building v1.0	x	
LEED US	LEED v4 for BD+C: Warehouses and Distribution Centers (update 2016)		x
Protocollo ITACA	Protocollo ITACA Nazionale 2011 – Edifici industriali (update 2012)	x	

* the specific scheme is only in German.

** information assumed due to the numerous warehouses certified at Prologis (https://www.prologis.com/sustainable-industrial-real-estate/environmental-stewardship/CASBEE-certification, accessed 05.12.17)

Tab. 1 - Comparison between Rating System.

	Thematic Area	N. of credits
LEED	LT – Location and transportation	7
	SS – Sustainable site	6
	WE – Water efficiency	5
	EA – Energy and atmosphere	7
	MR – Materials and resources	5
	EQ – Indoor environmental quality	10
	IN – Innovation	2
Author's addition	PA – Perceptual-aesthetic aspects	8

Tab. 2 - The assessment system.

However, it is necessary to underline that the new thematic area (PA) refers to credits that are generally measured by qualitative indicators, which are intimately different from the quantitative ones typical of environmental analyses. Therefore, great attention was paid in the choice of the new indicators, and an effort to select from the literature those with the most objective and quantifiable features was made. Then, each new credit has been described through a specific card, which has been added to the LEED original cards included in the user manual.

Overall, the developed assessment system refers to the iterative approach implemented by RELi. This means that the project is validated in subsequent phases, during which it is progressively refined, up to the evaluation of residual effects that cannot be mitigated. The same circular procedure was applied to the research itself, which was tested twice, gradually improving the tool itself.

As a result, the current version of the protocol (V1) has been obtained by combining the described system with the catalogue of mitigation tactics (Activity 2), and then it has been applied to Orogel (Activity 3).

Results and conclusions

Although in progress, the research attempts to formulate a new support design tool to increase the resilience of the built environment, starting from the regeneration of existing industrial sites and the good design of the new ones.

This objective led to an experimental application of the basic principles of the new RSs family to the industrial asset, by adopting a sound and structured reference such as the LEED protocol. In this context, the designer assumes the role of director of the transformation, who sets the criteria of analysis and defines the general tactics of intervention without declining them into specific solutions, which are instead left to the subsequent application of the protocol on particular case studies. Up to date, the assessing system of Protocol V1 consists of 51 credits, gathered into 8 thematic areas. The application of V1 to Orogel highlighted the potentiality of the system, which makes it possible to identify issues and intervention priorities, and producing open design responses based on the different needs of the involved stakeholders. Hence, the company – or the designer on its behalf – can improve its landscape impact by selecting the most suitable mitigation tactics, based on the emerged criticalities. The system outlined above constitutes an analytical and proactive basic structure useful for managing the transformation of a complex heritage as the industrial one.

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