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Research article

Targeted selection of brownfields from portfolios for sustainable regeneration: User experiences from five cases testing the Timbre Brownfield Prioritization Tool

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ABSTRACT

Prioritizing brownfields for redevelopment in real estate portfolios can contribute to more sustainable regeneration and land management. Owners of large real estate and brownfield portfolios are challenged to allocate their limited resources to the development of the most critical or promising sites, in terms of time and cost efficiency. Authorities worried about the negative impacts of brownfields – in particular in the case of potential contamination – on the environment and society also need to prioritize their resources to those brownfields that most urgently deserve attention and intervention. Yet, numerous factors have to be considered for prioritizing actions, in particular when adhering to sustainability principles. Several multiple-criteria decision analysis (MCDA) approaches and tools have been suggested in order to support these actors in managing their brownfield portfolios. Based on lessons learned from the literature on success factors, sustainability assessment and MCDA approaches, researchers from a recent EU project have developed the web-based Timbre Brownfield Prioritization Tool (TBPT). It facilitates assessment and prioritization of a portfolio of sites on the basis of the probability of successful and sustainable regeneration or according to individually specified objectives. This paper introduces the challenges of brownfield portfolio management in general and reports about the application of the TBPT in five cases: practical test-uses by two large institutional land owners from Germany, a local and a regional administrative body from the Czech Republic, and an expert from a national environmental authority from Romania. Based on literature requirements for sustainability assessment tools and on the end-users' feedbacks from the practical tests, we discuss the TBPT's strengths and weaknesses in order to inform and give recommendations for future development of prioritization tools.

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1. Introduction

The efficient use of soils and land has increasingly been understood as a key to sustainable development, stable ecosystem services and food-security globally (Amundson et al., 2015; Bateman et al., 2013; Gardi et al., 2015; Thornton et al., 2007). Land recycling, that is the functional reintegration of brownfields,

which have lost their previous function and purpose, is being promoted as an important measure to reduce land-take of fertile soils (EC, 2012) and towards achieving a land-degradation neutral world (UN, 2014).

Indeed, there are many brownfield sites – for example, 120,000 ha in Germany are brownfield or underutilized spaces between buildings available for reuse (Schiller et al., 2013). Each brownfield represents specific challenges for the environment and adjacent community as it has been affected by former uses; is derelict or underused; requires intervention to bring it back to beneficial use; and may have real or perceived contamination

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problems (cf. CEN, 2014). Moreover, all brownfield sites vary concerning their unique characteristics, such as location, size, extent of potential contamination resulting from previous use, etc. As a result, diverse stakeholders have heterogeneous concerns regarding successful and sustainable brownfield regeneration (Rizzo et al., 2015).

A concern is often to identify from among a multitude of properties those that present the highest potential for regeneration, or to concentrate limited resources for sites where hazard prevention is of highest priority. In this sense, an effective exploration of regeneration options poses particular challenges in the management of real estate portfolios. It is a complex task for land-owners to prioritize brownfields in a way that provides suitable solutions for both general and specific requirements in an efficient and clearly structured manner.

On the one hand, owners of complex real-estate and brownfield portfolios have to deal with the organization and handling of their portfolio. This becomes increasingly difficult and complex as the number of sites contained in the portfolio increases and the more heterogeneous the (potentially) contaminated sites are regarding previous use or re-use options. On the other hand, it is necessary to give reliable answers with as little effort as possible about the availability of sites according to specific criteria and about the suitability of these sites for certain re-uses. A key issue for portfolio-owners is to match the manifold requirements of a specific development project with a list of brownfield sites with diverse characteristics (Bartke et al., 2014). The same holds for problem-owners or public authorities who deal with brownfields in their (administrative) region and have to decide on the allocation of intervention measures. Many institutional property owners or local authorities have developed comprehensive land registers. However, an increasing size and level of detail of these databases goes along with a decrease in clarity and comprehensibility.

Along with the complexity related to the availability of data, a prioritization/optimization process is strictly dependent on the identification of sound goals. As stated by Kiker et al. (2005), effective environmental decision making depends on considering (multi)criteria derived from environmental, ecological, technological, economic and socio-political factors, which make the process 'multi-objective'. By including and accentuating measures of sustainability, more environmentally friendly, economically worth and socially accepted results can be achieved, implementing the three pillars approach of sustainable development (WCED, 1987), which has been implemented in numerous standards and certification systems (Manning et al., 2011; Reinecke et al., 2012).

In order to deal with the complex decision-making processes, several multi-criteria decision analysis (MCDA) approaches and tools have been developed and increasingly applied in different fields, including the land-use context. Prioritization tools based on sustainability frameworks and MCDA allow assessing requalification options from different points of view, respecting the needs of multiple stakeholders (e.g. Chen et al., 2009; Chrysochoou et al., 2012; Nogués and Arroyo, 2016). MCDA tools are used in the presented methodology due to their ability to combine heterogeneous inputs with cost/benefit information and stakeholder views and they are recognized as suitable tools able to support the ranking of regeneration alternatives based on the sustainability framework (Critto et al., 2006; Boggia and Cortina, 2010; Rosén et al., 2015).

However, as Bartke and Schwarze (2015) have emphasized, tools that have the goal to both assess sustainability and give user-support at the same time must fulfill user-group specific requirements in order for the tools to be taken up by the end-users in their practical work. Elsewise, even scientifically perfect sustainability evaluation tools will not be used in practice, for example, if the needed data are not available or their handling is too complex.

The authors conclude that the design of sustainability assessment tools must adopt a two-tier approach, integrating top-down a normative perspective, which means a deductive demand for specific tool constituents embodied in and reflecting general sustainability principles, with an bottom-up inductive approach understanding end-users' needs. Bartke and Schwarze derive a set of criteria to describe these user requirements, such as objectivity or practicability. Any MCDA tool for prioritizing brownfield selection from portfolios also needs to satisfy user needs and should be tested against ease of use for end-users.

2. Scope and objective

How can portfolio owners find out which of the brownfields contained in their portfolio present the highest potential for a specific use? Which of the sites should be chosen to make the most effective use of the scarce resources? This article starts from the following real world observation: different stakeholders are faced with a portfolio of brownfields – real estate owners, investors or problem owners – and they are interested in selecting from this portfolio in a targeted way those sites that are most promising to achieve certain aims, such as lucrative or ecologically necessary regeneration. This understanding of portfolio management differs from the financial real estate portfolio management (following e.g. Markowitz, 1952), which focusses on questions of theoretically optimal strategic bundling of real-estate or brownfield portfolios, in which the composition of the property portfolio impacts on the return on investment.

Within the EU Seventh Framework Programme project TIMBRE, researchers pursued this observation and developed a specific tool – the Timbre Brownfield Prioritization Tool (TBPT or TBP-Tool) – drawing on the expertise of scientists, regulatory bodies and business representatives (cf. Pizzol et al., 2016). The aim of the tool is to assist stakeholders in the identification of those brownfield sites that should be preferably considered for regeneration. This is achieved by taking into account a set of success factors, which represent stakeholders' regeneration objectives. The factors are based on the three pillars of sustainability (economic, social and environmental dimensions). It has been designed to be user-friendly, intuitive, web-based, flexible solution, which supports stakeholders in the allocation of available limited resources to those areas that are assessed to be the most critical, urgent or profitable to be regenerated – tailored to sustainable development or individual needs and preferences of the end-users (Pizzol et al., 2016).

Next to a general discussion of MCDA in brownfield regeneration in a portfolio context, the added value of this contribution is that the TBP-Tool developers actually went about testing the tool's applicability; and this process of asking for and analyzing feedback, to our best knowledge, stands out in terms of a novel contribution to the brownfield regeneration literature.

Institutional, administrative and problem owners of large property portfolios and real estate developers from three countries were asked to apply the TBPT for their portfolios. Their experiences serve to highlight the key characteristics of the tool. A total of five cases are reported here: Practical test uses by two large institutional land owners from Germany, a local and a regional administrative body from the Czech Republic, and by a key expert representing the Romanian National Environmental Protection Agency (NEPA).

Next, this article provides brief background to the state-of-the-art of MCDA application in brownfield management. In Section 4, we present the main functionalities of the TBPT. Subsequently, Section 5 reports on the experience that the end-users of the TBPT have gained in the Czech Republic, Germany and Romania. In Section 6, we discuss the strengths, weaknesses, chances and risks of

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