



Proceedings

Meta-Methodology of Global Approaches to Brownfield Redevelopment Studies: Insights for Urban and Architectural Redesign

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Abstract: This study examines the application of research methodologies in brownfield research. We reviewed 18 articles (2018-2023) through meta-analysis to integrate methodological approaches. There are four main themes in the results: community involvement, urban planning, environmental sustainability, and technology. The most important of these is environmental sustainability. Quantitative methods dominated the literature, while mixed-methods approaches were inadequately utilized. A deficiency was identified in comparative studies assessing the impacts of brownfield redevelopment on minority communities. Qualitative studies showed that they didn't use analytical tools very often and sometimes used theoretical frameworks that weren't very clear. The study concludes that brownfield redevelopment offers insights for architectural and urban redesign, positioning it as a crucial process in spatial transformation.

Keywords: Meta-Methodology; Brownfield; Redevelopment

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1. Introduction

Brownfield redevelopment is a common urban policy in developed nations, but difficult elsewhere [1]. Neglected sites harm the environment [2] but offer major redevelopment potential [3]. Their central locations aid sustainable planning [4,5], reduce sprawl [6], and revitalize communities [7] for territorial sustainability [8]. Global initiatives like Green Deals promote their sustainable transformation [9-11]. Despite the growing body of literature, a critical gap exists in understanding the overarching methodological patterns and biases within brownfield redevelopment research. This study directly addresses this gap. The primary research question is, "How are research methodologies applied in the field of brownfield redevelopment studies?" The main objective is a thematic category for (1) identifying and classifying the philosophical underpinnings, research strategies, and methods used in recent studies (2018-2023); (2) analyzing the distribution of these methodologies across different thematic categories (e.g., sustainability, participation, planning); and (3) identifying predominant trends and significant research gaps. This analysis contributes to urban redesign by assessing the evidence and assumptions underlying spatial interventions. The methodology influences redevelopment thinking, prioritizing efficiency and social narratives in the urban vision.

2. Area of Study

This research investigates brownfields. The term started in North America, but it is now used all over the world [4]. They are typically post-industrial urban areas [7, 12], defined as underused, abandoned, or potentially contaminated lands from prior industrial, military, or commercial uses

[18]. Their neglect creates environmental, economic, and social problems, harming public health and fueling uneven urban growth [13, 14]. Conversely, brownfield redevelopment is a vital urban revitalization strategy. It transforms these lands for sustainable use and urban regeneration. This process can repair neighborhood fabrics, protect natural land, improve urban quality, and stimulate local economies [15, 16]. But their spread threatens sustainability by harming ecosystems and land productivity [17]. Therefore, managing brownfields in a way that is beneficial for the environment is important for long-term growth.

3. Methodology

This study employs a meta-methodological framework to systematically analyze research methodologies in brownfield redevelopment studies. The research onion model by Saunders et al. (2012) guided the formulation of the primary research question: "How are research methodologies employed in studies on brownfield redevelopment?" A systematic search was executed in the Web of Science database for English-language articles published from 2018 to 2023, applying stringent content-related criteria centered on theoretical frameworks and the progression of knowledge in brownfield redevelopment. After carefully reading the abstracts, titles, and how well they answered the research question, we chose 18 articles for final analysis. The selected articles were analyzed using MAXQDA software, utilizing content analysis and inductive coding techniques, concentrating on methodological aspects including research philosophy, approach, strategy, and data collection/analysis methods. This systematic approach enabled a comprehensive examination of methodological patterns and trends within the field.

4. Results

This study was conducted with 18 studies, which are presented in Table 1. This review found that 60% of the research used quantitative methods for implementation. Meanwhile, only 25% of the studies used mixed methods, and 15% of the research utilized qualitative methods. Thematically, environmental sustainability has received the most attention, and methodologically, positivism and deductive approaches have been predominant. This is while the analytical tools in the research are primarily reviewing study and cross-sectional data collection. In terms of analytical tools, GIS software has been the most common method. These findings indicated that in urban and architectural redesign projects, attention to qualitative methodology, focus on social and economic dimensions alongside the environmental component, and combining modern methods with GIS can contribute to innovation and filling the research gap in this field.

Table 1. Selected articles

Authors (Year)	Data collection	Analysis
Glumac & Schaefer 2018 [19]	Interview /Questionnaire	Thematic and Factor
Beameset al.,2018 [20]	Field Surveys /Documentary-library research	Spatial
Ahmadet al.,2018 [21]	Questionnaire /Documentary-library research /Questionnaire	Delphi/ Spatial data
Cappai ,2019 [22]	Field Surveys	Spatial
Zhao ,2019 [23]	Documentary-library research /Questionnaire	Descriptive (Mean)
Tendero& Plottu, 2019 [24]	Questionnaire/ Documentary-library research	Multi-Criteria
O'Connor etal.,2019 [25]	Questionnaire/ Documentary-library research	Descriptive (Mean)
Venter,2020 [26]	Interview	Thematic
Wang et al.,2020 [27]	Interview /Documentary-library research	Content
Krošelj et al.,2022 [28]	Questionnaire	Factor
Chen & Yang, 2022 [29]	Field Surveys /Documentary-library research	Spatial
Jian et al.,2022 [30]	Questionnaire /Documentary-library research /Interview	Descriptive (Mean) /Content
Masiero et al.,2022 [31]	Field Surveys /Documentary-library research /Interview	Spatial, Factor and Content
Tajani & Di Liddo2023 [32]	Questionnaire /Documentary-library research	Factor
Alshehri et al.,2023 [33]	Questionnaire	Spatial
Cui & Fang,2023 [34]	Questionnaire /Interview	Content
Zheng & Masrabaye, 2023 [35]	Interview	Coding and Factor
Hammondet al.,2023 [36]	Interview /Questionnaire /Documentary-library research	Multi-Criteria and Coding

4. Conclusion

This review, utilizing a meta-methodological approach on studies of brownfield redevelopment, determined that in the redevelopment of these lands, the methods have focused on quantitative, positive approaches, and the outcomes on environmental sustainability. This issue indicates a lack of diversity in methodology. The results of this study, considering this shortcoming, have identified three problems: insufficient focus on qualitative approaches in methodology and mixed methods, insufficient comparative studies on the subject, and inadequate attention to communities, including vulnerable groups. Future research should focus on utilizing a more diverse range of methodologies, developing standardized qualitative frameworks, and investigating the social and cultural aspects of brownfield regeneration to advance the field. This bias in methodology could potentially result in redevelopment plans that do not adequately address social demands but instead meet techno-environmental demands for a certain area. More emphasis on qualitative research would ensure that designers taking up such projects are able to incorporate socio-cultural equity into the physical development of brownfield areas. By acknowledging that research methodology generates specific types of evidence, it could also influence urban design. In instances of redevelopment strategies primarily driven by quantitative indicators, the resulting design often focuses on efficiency, maximum land use, and environmentally responsible practices, frequently neglecting place and lived experience. A qualitative/comparative research approach could offer better support for context-sensitive design practices. This would enable architectural designers to engage more effectively with histories, perceptions, and inequalities that are context-specific. It must be noted that architectural design considerations play a major role in defining the structure, significance, and inclusiveness of brownfield development proposals. Such considerations are not neutral.

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