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Regenerative urban transformation in urban planning: A systematic review of key themes and planning implications

Regenerative development has gained prominence as an ecological paradigm in urban planning; however, its integration into urban transformation processes remains conceptually fragmented and uneven in practice. This study examines how regenerative development is framed within discussions on urban transformation, with a particular focus on its implications for planning systems and policymaking. A systematic literature review, guided by PRISMA protocols, identified thirty-eight peer-reviewed articles indexed in Scopus, which were coded using MAXQDA and analysed through reflexive thematic analysis. The findings reveal five interrelated dimensions of regenerative urban transformation (RUT): underlying rationales, key components, implementation challenges, modes of integration into urban planning, and evaluation approaches. The literature positions RUT as a response to the unsustainability of dominant urban models that degrade ecosystems and increase climate vulnerability. Core components – such as circular economy principles, public participation, adaptive reuse, and digital technologies – are widely acknowledged but often addressed as isolated interventions rather than integrated planning mechanisms. Key challenges include limited social acceptance, financing constraints, behavioural change requirements, and weak institutional coordination. Although integration into urban planning is commonly framed through alignment with sustainable development strategies and ecosystem services, persistent gaps remain in governance alignment and policy coherence. The study concludes that current assessment tools suffer from limited scale adaptability and weak links to planning and policy decision-making, constraining the practical evaluation of RUT.

Keywords: regenerative development, regenerative urbanism, urban regeneration, circular city, reflexive thematic analysis

1 Introduction

Cities are settlements at the heart of global production and consumption dynamics. Climate change, one of today's most critical environmental issues, and the various negative consequences arising from this change are primarily driven by urbanization processes. For example, problems such as increasing carbon emissions, the unsustainable use of natural resources, and the degradation of ecosystems are directly related to pressures exerted by cities.

The United Nations Sustainable Development Goals also emphasize that transforming cities into more liveable and resilient structures is possible by reducing the effects of climate change on urban areas and restructuring these spaces to adapt to climatic changes (United Nations, 2025). Cities that are particularly vulnerable in terms of infrastructure are under serious threat from climate-related risks, such as heatwaves, urban floods, extreme weather conditions, and drought. The regenerative development approach, which aims to mitigate the adverse effects of climate change and create resilient urban structures, is considered a key planning paradigm that has gained significance in recent years (Sala Benites et al., 2023).

One of the leading solutions proposed to address the problems of urban sprawl caused by urbanization is the re-evaluation of urban areas that are physically and functionally degraded, worn out, or derelict. This process, referred to in the literature as "urban transformation" or "urban renewal", offers various opportunities that allow not only spatial restructuring but also the holistic reconfiguration of urbanization. The "integrated urban transformation" approach, as defined in the Toledo Declaration (European Union, 2010), is noteworthy. This approach envisages transforming urban transformation processes from fragmented, narrow-scope applications into a planned, strategic process that approaches cities from a holistic perspective and considers their components as integral parts of the urban metabolism (LopezDeAsiain & Díaz-García, 2020).

Urban regeneration projects are of strategic importance due to their potential to inform future resource use models and contribute to shaping urban infrastructure over a period of approximately thirty years (Roberts & Sykes, 2000; UN-Habitat, 2016). However, examining current practices reveals that the vast majority of these focus solely on physical renewal and do not sufficiently consider the ecological dimension in the analysis, design, and implementation phases (Couch et al., 2011). Specifically, from an urban ecology perspective, this narrow focus limits the integration of ecological considerations, thereby constraining the potential of urban transformation processes to generate benefits such as ecosystem restoration, biodiversity enhancement, and improved ecosystem service provision (Alberti, 2008).

Urban regeneration has traditionally referred to the physical, economic, and social revitalization of declining urban areas through redevelopment and place-based investment strategies (Roberts et al., 2017). Although urban regeneration policies – often centred on physical redevelopment, economic revitalization, and place-based improvements – have increasingly incorporated sustainability considerations, they have largely remained focused on enhancing existing urban conditions, rather than reconfiguring the underlying relationships between urban systems and ecological processes (Roberts et al., 2017; Couch et al., 2011). In contrast, regenerative development adopts a systems-oriented perspective that seeks not only to minimize environmental harm but also to restore and enhance the regenerative capacity of socio-ecological systems. Within urban contexts, this perspective has given rise to the concept of regenerative urbanism, which frames cities as active agents capable of producing net-positive ecological and social outcomes in the Anthropocene (Thomson & Newman, 2020). This perspective differs from resilient urbanism, which primarily emphasizes the capacity of urban systems to adapt to disturbances and maintain functionality under conditions of uncertainty and environmental stress (Davoudi, 2014). In contrast, regenerative approaches extend beyond resilience by prioritizing ecological restoration, ecosystem function enhancement, and systemic transformation (Davoudi, 2014; Thomson & Newman, 2020).

Therefore, this study examines how regenerative urban transformation (RUT) is conceptualized and integrated into urban transformation processes, with a particular focus on its implications for planning frameworks, governance structures, and policy-oriented decision-making. By synthesizing fragmented conceptual and methodological discussions through a systematic literature review, the study clarifies how RUT can inform planning practice. To address this objective, the study is guided by the following research questions: 1) What are the fundamental rationales behind RUT? 2) What are the key components of RUT? 3) What are the challenges encountered in the RUT process? 4) How can RUT be integrated into urban planning? 5) How can the success of RUT be measured?

2 Methodological approach

2.1 Research design

In the data collection phase, a systematic literature review was conducted following PRISMA guidelines, consisting of

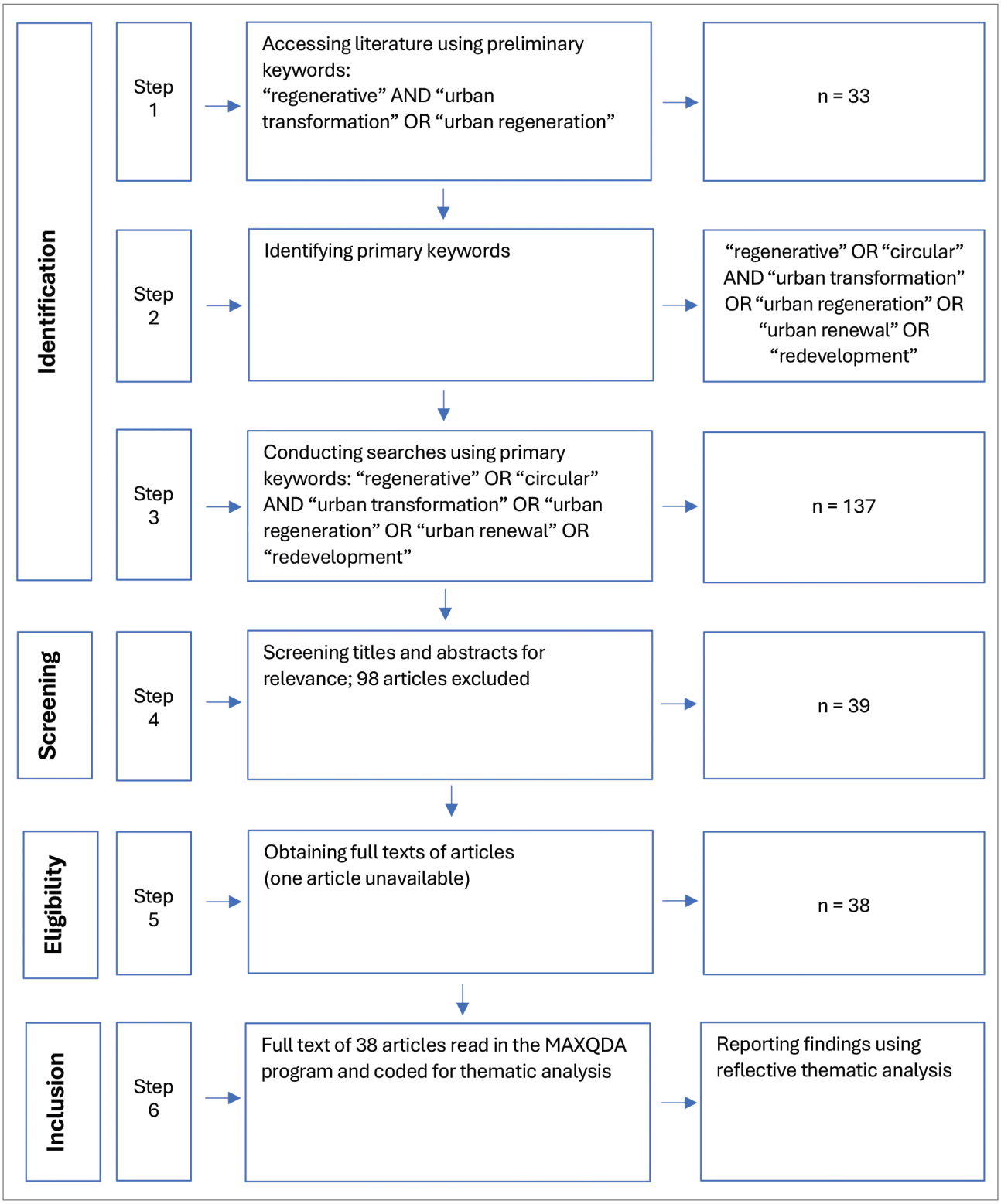

Figure 1: Stages of the systematic literature review process for the study (based on the PRISMA flow diagram).

four stages: identification, screening, eligibility, and inclusion (Moher et al., 2009; Page et al., 2021). The full texts of the selected articles were then accessed and coded using MAXQDA software. The coded material was analysed using reflexive thematic analysis, allowing the identification of patterns of meaning across the dataset (Braun & Clarke, 2021). The results are presented in the section on research outcomes.

2.2 Data collection

A six-step method was employed to structure the data collection and analysis stages of the systematic literature review process (Figure 1). Within this scope, access to relevant literature was first retrieved from the SCOPUS database using preliminary keywords representing the research. The articles retrieved were reviewed, and new keywords selected from these articles that strongly represented the research were added to the research sequence to form the final search strategy for the study. In the next step, a new SCOPUS search was conducted using this final search strategy. The authors reviewed the titles and abstracts of 137 articles to assess their relevance to the study scope, and ninety-eight articles were excluded based on criteria such as lack of relevance to urban planning, non-peer-reviewed publication types, and insufficient engagement with regenerative approaches. Of the thirty-nine articles considered, only one article was inaccessible, and the full texts of thirty-eight articles were archived.

The SCOPUS database search was conducted on 2 March 2025. The criteria considered for including or excluding articles from the study are as follows:

1. Publication in journals indexed in the SCOPUS database: the literature review was conducted using the SCOPUS indexing platform.
2. Publication type as "article": publications that had not undergone a peer-review process were excluded from the study.
3. Publication language "English": publications written in languages other than English were excluded from the study.
4. Article publication date before 31 December 2024: because the final literature review was conducted in early 2025, this date restriction was applied; however, no start date restriction was imposed because the concept of regeneration emerged relatively recently in urban planning literature.
5. Relevance to urban planning: because the concept of regeneration appears in multiple disciplines, the SCOPUS literature search was limited to the subject areas of environmental science and social sciences, which encompass urban planning research.

2.3 Data analysis

Following access to the full texts of the thirty-eight articles, all studies were systematically imported into MAXQDA software and subjected to an iterative coding process. In the first phase, initial codes were generated inductively by closely reading the texts and identifying recurring concepts, arguments, and analytical emphases related to regenerative urban development and urban transformation. In the second phase, these initial codes were reviewed, compared, and clustered based on conceptual similarity and theoretical relevance, rather than on their frequency of occurrence.

Through this process of abstraction and refinement, broader patterns of meaning were identified, leading to the development of five main themes and their corresponding sub-themes. These themes represent analytically constructed categories that synthesize the key dimensions emphasized across the literature reviewed. The resulting thematic structure and its components are presented in Table 1. Detailed supporting data are available in the repository (Başcan Yüce & Tezer, 2026).

It should be noted that Table 1 is structured to distinguish between themes derived directly from the thematic analysis and additional sub-themes developed during the discussion phase. The main themes and sub-themes presented in the results section emerged inductively from the reflexive thematic analysis of the literature reviewed and represent patterns of meaning explicitly identified within the dataset.

In contrast, the sub-themes presented under the discussion section were not directly generated through the coding and thematic analysis process. Instead, these themes were developed interpretively by synthesizing the analytical findings with broader theoretical discussions and gaps identified in the literature. Their inclusion aims to extend the analytical framework by highlighting conceptual dimensions that were underrepresented or absent in the studies analysed but are critical for the effective integration of RUT into planning practice. Accordingly, these discussion-based sub-themes should be understood as conceptual propositions rather than empirical findings.

2.4 Methodological limitations

Despite the systematic approach adopted in this study, several limitations should be acknowledged. First, the literature search was conducted using the SCOPUS database, which, although widely recognized as one of the most comprehensive academic indexing platforms, may not include all relevant publications available in other databases. Second, the review focused on English-language publications, potentially excluding relevant studies published in other languages. Third, as with many systematic literature reviews employing qualitative thematic synthesis, the identification and interpretation of themes involve a certain degree of researcher interpretation. To mitigate this limitation, the coding and thematic categorization process was conducted systematically and iteratively to ensure consistency and transparency in the analytical framework. Despite these

Table 1: Themes and sub-themes of regenerative urban transformation identified through reflexive thematic analysis.

Sub-theme	Main themes				
	1. Rationale	2. Key components	3. Challenges	4. Integration into urban planning	5. Evaluation
1	Unsustainability of the current urban planning model	Circular economy principles	Complexity and need for interdisciplinary approach	Integration into sustainable urban development strategies	Assessment tools and indicators
2	Excessive destruction of ecosystem services	Use of participatory and collaborative planning approaches	High investment requirements	Integration of ESs into the planning system	—
3	Need to increase urban resilience against climate change	Adaptive reuse	Behaviour change and social acceptance	Site-specific design and urban experiments	—
4	—	Use of digital technologies	—	—	—
Additional	Technological developments and smart city applications	Capacity for cross-system integration	Misuse of technology	Institutional governance and policy alignment	Data collection capacity, scale adaptability, technology integration

Source: authors.

limitations, the study provides a comprehensive overview of the emerging discourse on RUT and offers a structured basis for future empirical and theoretical research.

3 Research outcomes

The thematic analysis of the literature reviewed revealed five main themes that structure the conceptual and practical dimensions of RUT. These themes and their associated sub-themes provide a structured overview of how the literature conceptualizes the rationale, components, challenges, integration into urban planning, and evaluation of RUT. The resulting thematic structure and its associated sub-themes are presented in Table 1.

3.1 Main theme: The rationale for RUT

The first of the three rationales identified within the scope of RUT is the unsustainability of the current urban planning model. The literature documents that problems such as the excessive consumption of non-renewable resources (Balletto et al., 2022; Domenech & Borrion, 2022; Girard & Nocca, 2020), waste production (Williams, 2019), pollution (Acri et al., 2021; Valenzuela et al., 2018; Lewin, 2013), and contributions to climate change (Boeri et al., 2022) collectively demonstrate the limitations of prevailing urban planning practices. Several studies further indicate that existing urban planning and governance systems exhibit limited capacity to address significant challenges related to environmental, economic, and social degradation (Nowakowska & Grodzicka-Kowalczyk, 2019). The literature increasingly emphasizes the need to reconsider prevailing development models and discusses alternative frameworks that can integrate ongoing urban change processes into planning systems (Herranz-Pascual et al., 2023). Moreover, previous urban sustainability approaches have been widely reported to be insufficient in ensuring active citizen participation, reducing poverty, preventing food insecurity, and effectively managing inequality in urban areas. In response to these limitations, regenerative urban planning is discussed in the literature as offering a strategic orientation toward the development of sustainable, healthy, and liveable cities (Sala Benites et al., 2023).

The second rationale identified within the scope of RUT concerns the excessive degradation of urban ecosystem services (ES). Previous studies indicate that urban expansion and human activities exert significant pressure on natural ecosystems, leading to the degradation and loss of ES within cities (Nesticò et al., 2022; Caratelli et al., 2019). Cities are further described as spaces where natural systems are displaced, with remaining urban nature often transformed into highly modified ecosystems (Thomson et al., 2022). Empirical evidence from Al-Ain illustrates this dynamic: prolonged intensive agriculture, urban development, and livestock farming have contributed to groundwater depletion, rendering aquifers non-renewable and undermining ecosystem services (Caratelli et al., 2019). These findings point to the limitations of conventional urban water

management approaches and reinforce the relevance of regenerative perspectives within urban planning. RUT is framed as an approach that seeks to reconnect urban areas with ecological systems, support ecosystem revitalization, and reduce further ecological degradation associated with urban use.

The third rationale identified within the scope of RUT relates to the need to enhance urban resilience in the context of climate change. Cities are widely described in the literature as being particularly vulnerable to climate-related impacts, which has focused increasing attention on resilience as a key concern in urban development discussions (Intergovernmental Panel on Climate Change, 2022; UN-Habitat, 2020; Meerow et al., 2016). Studies emphasize that addressing climate-related risks requires sustainable and innovative approaches that integrate social, economic, and physical dimensions of the built environment (Ahern, 2011; Bühler et al., 2024; Elmqvist et al., 2019; Sala Benites et al., 2023).

3.2 Main theme: Key components of RUT

Four sub-themes were identified as the key components of RUT. The first sub-theme concerns the principles of the circular economy. Cappellaro et al. (2019) frame circular urban transformation as an approach that promotes the use of renewable resources and supports the continuous circulation of materials through closed-loop systems. The same authors also emphasize that such systems contribute to the optimization of resource use and are associated with reductions in carbon emissions and pollution levels.

Nowakowska and Grodzicka-Kowalczyk (2019) argue that planning cities according to circular principles is associated with enhanced levels of self-sufficiency and renewability. Viglioglia et al. (2021) and Balletto et al. (2022) discuss circular economy principles as having the potential to be integrated across multiple urban functions when urban problems are addressed from a regenerative perspective. Williams (2019) presents empirical examples, such as organic waste recycling and energy recovery practices, illustrating how circular resource management can reduce pressures on ecosystem services and contribute to the development of regenerative urban systems. Cappellaro et al. (2019) report that cities adopting circular economy planning principles support sustainable growth and strengthen self-renewal capacities through the coordinated management of resource consumption and waste production processes. Valenzuela et al. (2018) provide quantitative evidence from case studies, showing that cities managed according to circular economy principles have achieved substantial reductions in waste generation, with reported decreases from 100% to 21.5% and further reduction potentials of up to 3.5%.

The second key component of RUT identified in the literature is the use of participatory and collaborative planning approaches. Bayulken and Huisingh (2015) and De Medici et al. (2018) emphasize that RUT processes are characterized by the involvement of multiple stakeholders, including residents, civil society organizations, the private sector, and public institutions. These authors further highlight that collaboration among these actors is closely associated with the effectiveness of regenerative processes. Participatory processes implemented in ecological and social contexts are discussed as mechanisms that encourage stakeholders to assume responsibility and foster cultures of cooperation (Bayulken & Huisingh, 2015; De Medici et al., 2018). LopezDeAsiain and Díaz-García (2020) report that flexible evaluation processes that facilitate interaction between expert knowledge and local knowledge support the development of context-specific regenerative solutions. LopezDeAsiain and Díaz-García (2020) also indicate that the initial step in participatory planning involves developing actor maps that identify relevant stakeholders and reflect their social, economic, and political dimensions.

Sala Benites et al. (2023) further underline that participatory processes in RUT are most effective when they are designed to include all relevant and representative stakeholders, rather than functioning as consultation mechanisms serving specific interest groups. LopezDeAsiain and Díaz-García (2020) emphasize the importance of establishing trust among stakeholders, Ricci (2022) highlights the need for participation tools adapted to local contexts, Girard and Nocca (2020) discuss the role of spaces that enable communities to generate innovative responses during periods of crisis, and Trzcińska (2021) focuses on understanding the actual needs of users.

The third fundamental component of RUT is adaptive reuse. Nowakowska and Grodzicka-Kowalczyk (2019), Petruskeviciute (2019), Williams (2019), and Iodice et al. (2020) describe adaptive reuse as encompassing multiple dimensions, including urban resource conservation, waste reduction, the revitalization of vacant and derelict urban areas, the preservation and reuse of cultural heritage, and support for climate change adaptation processes. From a regenerative perspective, Petruskeviciute (2019) frames adaptive reuse as requiring an understanding of urban areas as dynamic and living systems. Ricci (2022) presents empirical examples from integrated renovation projects implemented in Poland, showing how the adaptive reuse of underutilized buildings and spaces can contribute to the revitalization of unsafe areas, enhance their social and cultural functions, and improve urban quality while preserving historical heritage. Ricci (2022) further highlights that the cyclical re-evaluation of vacant properties and the repurposing of underutilized buildings can generate social

benefits, including employment opportunities and enhanced service provision.

The fourth fundamental component identified within the scope of RUT is the use of digital technologies. Franchino et al. (2022) examine the use of digital technologies in the RUT process, particularly in relation to environmental impact assessment and information provision, and Viglioglia et al. (2021) focus on their role in scenario simulation and planning support. They further discuss how digital technologies can support resource efficiency by facilitating the adoption of regenerative behaviours and allowing urban systems to operate more efficiently.

Viglioglia et al. (2021) associate digital tools with managing the complexity of circular economy processes and improving efficiency across design, construction, and operational phases, and Franchino et al. (2022) emphasize the role of digitalization in the restoration and renewal of urban heritage. Empirical applications of digital tools further illustrate these dynamics. For instance, the Building Information Modelling (BIM) software developed and tested in an Italian case study made it possible to identify buildings' ecological impacts at the design stage through digital modelling, allowing for design revisions that reduce ecological damage (Franchino et al., 2022). Such digital tools, implemented at different spatial scales, could contribute to more informed and efficient decision-making processes by allowing the comparison of planning scenarios and associated environmental impacts.

3.3 Main theme: Challenges in the RUT process

The literature consistently identifies complexity as a central challenge in the RUT process, emphasizing that RUT is inherently interdisciplinary in nature. This complexity arises from the need to establish effective interaction within urban systems composed of multiple socio-technical structures, including the joint production of new forms of knowledge, the adaptation of institutional frameworks, and the coherent coordination of these processes (Gianfrate et al., 2020). Della Spina (2019) points to the difficulty of achieving stable interactions between local resources and settlement identity through synergies among the spaces, functions, and actors involved in RUT processes. Because regenerative actions simultaneously engage geographical, administrative, ecological, and social systems, Gianfrate et al. (2020) characterize RUT as a governance-intensive process that requires strong coordination, facilitation, and management capacities. Newton and Frantzeskaki (2021) demonstrate that interdisciplinary collaboration is essential for addressing complex urban challenges. At the same time, Thomson et al. (2022) caution that interdisciplinary work may reproduce siloed forms of knowledge if not carefully structured, potentially constraining its transformative potential.

A second sub-theme widely discussed in relation to challenges in the RUT process concerns financing. Girard and Nocca (2020) emphasize that RUT projects are typically associated with high initial investment requirements, rendering financial feasibility a persistent concern. They further argue that persuading policymakers, private actors, and the public to invest in regenerative transformation remains difficult, despite the increasing promotion of public–private partnerships and innovative financing mechanisms. They also highlight that this challenge is intensified by the limited availability of analytical tools capable of demonstrating the multidimensional benefits of regenerative approaches. Bayulken and Huisingh (2015) emphasize the strategic role of public finance and incentive mechanisms in mobilizing private investment and supporting regenerative urban development. Empirical evidence from France, for example, illustrates how housing cooperatives involved in urban transformation initiatives have leveraged their scale and institutional reliability to secure long-term loan arrangements, thereby increasing financial flexibility for residents (Trzcińska, 2021).

The final sub-theme associated with challenges in the RUT process relates to social behaviour and perception. Beyond physical transformation, the literature increasingly recognizes that RUT is closely linked to shifts in everyday practices, lifestyles, and value systems. Regenerative approaches are framed as requiring a systems-oriented perspective that accounts for entire life cycles and foregrounds alternative modes of production and consumption (Domenech & Borrion, 2022). Boeri et al. (2022) argue that legislative and policy measures alone are insufficient to achieve climate neutrality, and they emphasize the necessity of behavioural change at individual, collective, and institutional levels, supported by participatory processes that foster environmental citizenship and climate justice. Empirical studies suggest that awareness-raising strategies – ranging from symbolic interventions to community-based practices – can positively influence behavioural change and social acceptance of regenerative approaches (Boeri et al., 2022). For instance, evidence from Italy indicates that circular economy practices, including community gardens, collaborative initiatives, and local production facilities, have contributed to positive shifts in social behaviour (Cappellaro et al., 2019). Conversely, other studies argue that, although administrative interventions may temporarily influence individual behaviour, such changes are unlikely to be sustained without the support of knowledge-based technological infrastructures (Newman, 2020). Accordingly, recent research highlights the potential of digital tools and interactive mechanisms – such as gami-

fication, coaching, and real-time feedback – to accelerate behavioural change and reinforce traditional knowledge-based strategies (Viglioglia et al., 2021).

3.4 Main theme: Integration of RUT into urban planning

The literature increasingly frames the integration of RUT into sustainable urban development strategies as an important dimension of embedding regenerative principles within urban planning practice. Existing studies suggest that such integration is closely associated with the need to engage with the complexity of existing urban fabrics, including structural, social, and ecological dimensions (Franchino et al., 2022; Viglioglia et al., 2021; Bayulken & Huisingh, 2015).

Applied urban regeneration studies further emphasize the importance of collaborative and multi-actor frameworks in embedding sustainability principles into planning processes (Idrizbegović Zgonić et al., 2024). Girard and Nocca (2020) describe urban planning as a key instrument for shifting urban organization from linear development models toward more circular and regenerative configurations. Fabi et al. (2021) and Girard and Nocca (2020) highlight that the adoption of holistic planning approaches addressing social, economic, and environmental dimensions, together with the incorporation of sustainable development goals and strategic planning frameworks, is a foundational step in integrating regenerative strategies into urban planning processes. Bellato et al. (2024) emphasize that regenerative approaches, particularly in tourism-oriented contexts, can support place-based transformation processes through multi-actor collaboration and the regeneration of social–ecological systems.

The literature also highlights the challenges associated with linking complex processes across different urban fabrics. Viglioglia et al. (2021) describe these challenges as requiring in-depth analysis of existing urban problems and structural complexities, as well as sustained collaboration among experts from diverse disciplinary backgrounds. Petruskeviciute (2019) and Cappellaro et al. (2019) emphasize the protection and enhancement of natural systems as an integral component of sustainable urban development strategies. They further argue that the weakened relationship between urban populations and urban ecologies can be strengthened through the expansion of green spaces and the reintegration of nature into the city, supported by practices such as community gardens and other nature-based solutions.

Trzcińska (2021) and Williams (2019) identify energy efficiency as an additional dimension of integration from an urban planning perspective. They highlight the role of transport planning policies that prioritize energy-efficient public transportation systems and encourage walking and cycling as key strategies for reducing urban energy consumption. Newman (2020) identifies the broader diffusion of renewable energy sources, particularly solar energy, as a contributing factor to RUT and long-term urban resilience.

A second sub-theme identified in the literature concerns the integration of ecosystem services (ESs) into urban planning systems. Thomson et al. (2022) frame RUT as an approach that seeks to restore, enhance, and actively produce ESs within urban environments through actions such as expanding green infrastructure, protecting water cycles, and supporting urban biodiversity. They further emphasize that, in cities where natural systems have been degraded due to urbanization, interdisciplinary assessments are employed to identify ecological damage, followed by planning interventions aimed at reestablishing and strengthening the relationship between urban form and ecosystem functions. Girard and Nocca (2020) describe urban planning as a key mechanism for safeguarding natural systems and for creating space within urban areas for nature to regenerate and multiply. Nesticò et al. (2022) provide empirical examples showing that cities planned with integrated and robust green infrastructure networks can function as producers of ecosystem services, contributing to the reactivation of abandoned areas, the expansion of social and recreational spaces, and improvements in urban quality of life and social well-being. Tatlić et al. (2024) examine urban green space indicators and demonstrate that data-driven evaluation tools are increasingly used in planning processes; however, their findings also reveal that such approaches remain limited in capturing the systemic and regenerative dimensions of urban transformation.

The final sub-theme addressed in the literature relates to site-specific design and urban experiments, particularly through context-sensitive design strategies and pilot interventions that test regenerative solutions at the local scale. LopezDeAsiain and Díaz-García (2020) show that comparative analyses of urban regeneration cases across Europe highlight how the outcomes of regenerative initiatives are significantly influenced by local conditions and site-specific characteristics. Accordingly, Gianfrate et al. (2020) describe RUT as requiring flexible and multi-scalar approaches that integrate the distinctive sociocultural, climatic, and structural features of each urban context. Girard and Nocca (2020) explain that urban transformation practices grounded in circular models aim to reduce economic, environmental, and social costs while simultaneously improving existing urban conditions.

Urban experiments are frequently highlighted as important instruments for testing and operationalizing regenerative ide-

as. The literature characterizes urban experiments as complex yet highly productive processes because they are conducted in real-world environments that cannot be fully controlled and actively involve social actors in both the initiation and implementation phases (Newton & Frantzeskaki, 2021). Illustrative examples include the Buiksloterham project in Amsterdam, initiated in 2015 through a strategy developed by the organization Metabolic and implemented in collaboration with more than twenty public and private actors. Nowakowska and Grodzicka-Kowalczyk (2019) describe the Buiksloterham project as an urban laboratory in which circular development strategies are implemented through requirements for sustainable building practices, the use of recovered materials, advanced waste and water management systems, and the development of renewable and self-sufficient energy solutions, supported by collaboration among multiple public and private actors. The project is described as an urban laboratory aimed at transforming the area into a circular and sustainable district, with long-term objectives oriented toward minimizing environmental losses and achieving regenerative resource use by 2050 (Nowakowska & Grodzicka-Kowalczyk, 2019). Similarly, Al-Ansari et al. (2024) examine a neighbourhood-scale regeneration case in Doha, demonstrating how context-specific planning interventions can address spatial and infrastructural challenges in rapidly urbanizing contexts.

3.5 Main theme: Evaluation of RUT

Bayulken and Huisingh (2015) emphasize the importance of measuring and monitoring the effects of RUT as a means of identifying challenges and informing adaptive improvements throughout the transformation process. They discuss performance evaluation in relation to comprehensive assessment frameworks that combine multiple indicators and evaluation components, addressing dimensions such as sustainability, ecosystem health, and social impacts. They also indicate that most assessment tools and methods currently applied in urban transformation processes primarily focus on optimizing resource consumption levels, rather than capturing net positive or regenerative impacts that account for ecological losses and potential offsets. Williams (2019) further argues that only a limited share of indicators typically used in sustainability reporting is suitable for evaluating regenerative transformation processes. Girard and Nocca (2020) highlight the need for assessment frameworks that more explicitly incorporate regenerative impacts into the evaluation of urban transformation projects. They further suggest that such frameworks benefit from a dynamic structure that integrates assessment, monitoring, and, where necessary, adaptive revision over time.

Several studies have proposed assessment tools designed to address this gap. Fabbricatti and Biancamano (2019) developed an urban regeneration evaluation framework for historic urban fabrics based on indicators of circularity, productivity, and resilience. By examining the tension between the preservation and enhancement of identity in historic contexts through a resilience-oriented lens, their study suggests that productive circular dynamics can emerge within regenerative renewal processes when resilience-oriented evaluation criteria are applied. Similarly, Williams (2019) introduced a performance framework consisting of levers, actions, and outcomes to examine the development of "circular capacities" in the regeneration of a port complex, which was empirically tested in the context of a port redevelopment project in Stockholm. More recently, Sala Benites et al. (2023) proposed the assessment tool Regenerative Circularity for the Built Environment (RC4BE), which comprises 136 criteria identified through a two-stage Delphi method. This tool aims to assess gaps and dynamics across multiple urban cycles, including ecosystems, liveability, infrastructure, governance, participation, and local economic and socioeconomic dimensions.

4 Discussion

Whereas several review studies have addressed regenerative development, circular urbanism, or sustainability-oriented urban transformation independently, this study contributes to the literature by explicitly positioning RUT within the disciplinary framework of urban planning and examining it through a systematic and reflexive thematic lens. Unlike reviews that primarily catalogue tools, indicators, or best practices, this study focuses on how regenerative principles are conceptually framed, operationalized, and problematized within urban transformation processes.

The findings indicate that, although RUT has an expanding presence in both theoretical and practice-oriented literature, it still lacks a fully consolidated conceptual framework. Identified gaps across themes point to ongoing theoretical and practical discontinuities, which are examined in the following discussion.

4.1 Gaps emerging in the rationale for RUT

Although this approach aligns with the main trajectory of the literature, the limited representation of the sub-theme "technological developments and smart urban applications" identified in Table 1 suggests that, despite its growing prominence in broader urban studies and policy discussions, the technological transformation dimension has not yet been addressed in an integrated manner within the RUT literature. Datta (2015) argues that smart city agendas are often shaped by entrepreneurial and efficiency-driven logics, and Luque-Ayala and Marvin (2015) critically examine how smart urbanism tends

to emphasize technical and managerial solutions. Similarly, Colding and Barthel (2017) highlight that urban ecological perspectives remain insufficiently addressed within the smart city literature. Whether digital infrastructures genuinely enhance the regenerative capacity of cities or merely reproduce a modern sustainability paradigm centred on efficiency therefore remains an open area of debate. This gap indicates that the current body of knowledge on the rationale for RUT remains predominantly ecological and governance-oriented, with technology often treated as a secondary or instrumental dimension.

4.2 Limited visibility of cross-system integration among the components of RUT

The findings confirm that widely recognized components of the RUT literature include circular economy principles, participatory processes, adaptive reuse strategies, and the use of digital technologies, but the absence of the theme "Capacity for Cross-System Integration" proposed in Table 1 among the empirical findings highlights a significant conceptual gap. Although regenerative approaches prioritize the strengthening of relational dynamics among ecological, social, and technological subsystems, the current literature often treats these systems as discrete domains. Consequently, the roles of interdependencies among energy–water–waste cycles, social infrastructures, and governance mechanisms in shaping regenerative outcomes remain only minimally examined. McPhearson et al. (2016) argue that urban research continues to address urban systems in a fragmented manner, and Bai et al. (2016) show that systems-based approaches remain insufficiently operationalized in practice. Hoff (2011) introduces the urban nexus as a framework for understanding interdependencies among resource systems, and Liu et al. (2007) emphasize the importance of conceptualizing human and natural systems as interconnected. This gap leads to interpretations of RUT primarily through isolated intervention domains, obscuring the multi-layered interactions that underpin regenerative transformation. Thus, the weak representation of this theme in the findings indicates that the interdisciplinary emphasis frequently highlighted in the literature has not been translated into an actual capacity for cross-system integration in practice, and that conceptually it remains a component whose contours are not yet fully articulated.

4.3 Challenges of RUT: Invisible risks beyond the well-known issues

Themes such as the need for an interdisciplinary approach, high financing requirements, and social acceptance, which emerge prominently in the findings, are recurring challenges to the feasibility of RUT in the literature. Although the theme of "misuse of technology" proposed in Table 1 does not appear prominently in the study, it nonetheless points to an important risk area identified by Ismagilova et al. (2022). Their analysis highlights that the deployment of data-driven technologies and smart systems may generate new forms of dependency and governance-related risks. The question of whether sensor-based monitoring systems or data-driven urban management tools genuinely align with regenerative objectives, or whether they create new dependency relations or governance vulnerabilities, remains unanswered in the literature. The absence of this issue in the findings suggests that the challenges of RUT continue to be discussed predominantly through socioeconomic frameworks. At the same time, technological risks remain peripheral even within theoretical scholarship.

4.4 Limited visibility of institutional governance and policy alignment

The findings concerning the integration of RUT into urban planning processes indicate that the process unfolds along three principal axes: its incorporation into sustainable urban development strategies, the integration of ecosystem services into the planning system, and the creation of place-based spatial experiences. This framework suggests that the regenerative approach should be understood not only as a complementary tool that supports environmental objectives but also as a paradigm that transforms how planning knowledge is produced and evaluated. However, the dimensions of institutional capacity, governance alignment, and policy coherence – which do not appear prominently in the study – constitute a critical gap in the integration of regenerative processes into planning systems. Similarly, recent studies highlight that urban regeneration processes require coordinated action across multiple institutional levels, including municipalities, local communities, and regulatory bodies, to ensure effective implementation (Idrizbegović Zgonić et al., 2024).

Bulkeley et al. (2011) demonstrate the role of multi-level governance and policy coordination in shaping urban transformation processes. Regenerative transformation therefore requires not only the reconfiguration of spatial instruments but also the harmonization of institutional coordination and regulatory frameworks. These perspectives suggest that governance structures play a critical yet underexplored role in shaping urban transformation. This situation highlights the need for further research on regenerative planning from governance and institutional perspectives.

4.5 Contemporary challenges in measuring RUT

The various sustainable city assessment tools and climate adaptation indices identified in the findings indicate an expanding body of literature on the measurability of RUT (Sala Benites et al., 2023; Williams, 2019; Fabbricatti & Biancamano, 2019). However, the overall structure of these assessment tools appears highly fragmented. A significant portion of these tools require access to comprehensive datasets, yet important practical challenges remain regarding data availability and data collection capacity, particularly at local administrative levels. The inability to ensure data continuity reduces the comparability of indicators, making the long-term evaluation of RUT more challenging. Moreover, the scale adaptability of existing tools has emerged as a challenging area. Many assessment frameworks do not provide indicators that can be consistently transferred across neighbourhood, district, city, and regional scales, thereby hindering the development of a measurement structure compatible with the multi-scalar nature of RUT. Therefore, future studies need to enhance RUT assessment frameworks in terms of data collection capacity, scale adaptability, and technology integration.

5 Conclusion

The findings indicate that, although RUT is gaining visibility, its conceptual consolidation and operational clarity remain limited. The analysis reveals that key dimensions of RUT – particularly cross-system integration, governance alignment, and measurement frameworks – remain insufficiently developed, resulting in a fragmented understanding of regenerative processes. These gaps suggest that RUT is still predominantly framed through ecological and project-based perspectives, and that its relational, institutional, and multi-scalar dimensions remain underexplored.

From a planning perspective, the results underline the need to reposition RUT as a governance-oriented paradigm rather than a set of isolated interventions. Advancing RUT requires stronger integration across urban systems, improved alignment between institutional and regulatory frameworks, and the development of adaptable evaluation tools capable of capturing long-term and multi-scalar impacts. Future research should therefore focus on translating regenerative principles into operational planning instruments, policy frameworks, and monitoring systems that can support the implementation and assessment of RUT in diverse urban contexts.

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Data availability statement

The dataset supporting the findings of this study is publicly available in Zenodo at https://doi.org/10.5281/zenodo.19737456. It includes the list of studies reviewed and associated metadata used in the systematic literature review.

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Regenerativna urbana preobrazba v urbanizmu: sistematični pregled ključnih tem in posledic za načrtovanje

Regenerativni razvoj je v urbanizmu pridobil pomen kot ekološka paradigma, vendar njegova integracija v procese urbane preobrazbe ostaja konceptualno razdrobljena in v praksi neenakomerna. Ta študija proučuje, kako je regenerativni razvoj opredeljen v razpravah o urbani preobrazbi, pri čemer so posebej poudarjene njegove posledice za sisteme načrtovanja in oblikovanje politik. S sistematičnim pregledom literature, izvedenem po protokolih PRISMA, je bilo opredeljeno osemintrideset recenziranih člankov, indeksiranih v Scopusu, ki so bili kodirani s programom MAXQDA in analizirani z refleksivno tematsko analizo. Ugotovitve razkrivajo pet medsebojno povezanih dimenzij regenerativne urbane preobrazbe (RUP): temeljna izhodišča, ključne komponente, izzive izvajanja, načine integracije v urbanizem in pristope vrednotenja. Literatura umešča RUP kot odziv na netrajnost prevladujočih urbanih modelov, ki degradirajo ekosisteme in povečujejo podnebno ranljivost. Temeljne sestavine – kot so načela krožnega gospodarstva, sodelovanje javnosti, prilagodljiva ponovna uporaba in digitalne tehnologije – so široko priznane, vendar so pogosto obravnavane kot posamezni posegi, ne pa kot uveljavljeni načrtovalski mehanizmi. Ključni izzivi vključujejo omejeno družbeno sprejemanje, finančne omejitve, zahteve po spremembi vedenja in šibko institucionalno usklajevanje. Čeprav je integracija v urbanizem običajno opredeljena prek uskladitve s strategijami trajnostnega razvoja in ekosistemskimi storitvami, so še vedno vrzeli pri usklajevanju upravljanja in politik. Študija ugotavlja, da so obstoječa orodja za ocenjevanje le delno prilagojena različnim merilom ter imajo šibke povezave z načrtovalskim in političnim odločanjem, kar omejuje praktično vrednotenje RUP.

Ključne besede: regenerativni razvoj, regenerativni urbanizem, urbana regeneracija, krožno mesto, refleksivna tematska analiza

1 Uvod

Mesta so naselja v središču globalnih dinamik proizvodnje in potrošnje. Podnebne spremembe, eno izmed najbolj perečih okoljskih vprašanj današnjega časa, in različne negativne posledice, ki izhajajo iz teh sprememb, so predvsem posledica procesov urbanizacije. Težave, kot so naraščajoče emisije ogljika, netrajnostna raba naravnih virov in degradacija ekosistemov, so neposredno povezane s pritiski, ki jih povzročajo mesta.

V ciljih trajnostnega razvoja Združenih narodov se prav tako poudarja, da je preoblikovanje mest v bolj bivalne in odporne strukture mogoče z zmanjševanjem učinkov podnebnih sprememb na urbana območja in prestrukturiranjem teh prostorov za prilagajanje podnebnim spremembam (United Nations, 2025). Mesta, ki so z vidika infrastrukture posebej ranljiva, so resno ogrožena zaradi tveganj, povezanih s podnebjem, kot so vročinski valovi, urbane poplave, ekstremni vremenski pojavi in suša. Pristop regenerativnega razvoja, cilj katerega je ublažiti škodljive učinke podnebnih sprememb in oblikovati odporne urbane strukture, velja za ključno načrtovalsko paradigmo, pomen katere se v zadnjih letih povečuje (Sala idr., 2023).

Ena od vodilnih rešitev, predlaganih za obravnavo problemov urbanega širjenja, ki ga povzroča urbanizacija, je ponovno ovrednotenje urbanih območij, ki so fizično in funkcionalno degradirana, izrabljena ali zapuščena. Ta proces, v literaturi imenovan »urbana preobrazba« ali »urbana prenova«, ponuja različne priložnosti, ki ne omogočajo le prostorskega prestrukturiranja, temveč tudi celostno preoblikovanje urbanizacije. Omeniti velja pristop »integrirane urbane preobrazbe«, kot je opredeljen v Deklaraciji iz Toleda (Evropska unija, 2010). Ta pristop predvideva preoblikovanje procesov urbane preobrazbe iz razdrobljenih, ozko zastavljenih praks v načrtovan, strateški proces, ki mesta obravnava s celostnega vidika in njihove komponente razume kot sestavne dele urbanega metabolizma (LopezDeAsiain in Díaz-García, 2020).

Projekti urbane regeneracije so strateško pomembni, ker imajo zmožnost za usmerjanje prihodnjih modelov rabe virov in prispevajo k oblikovanju urbane infrastrukture v približno tridesetih letih (Roberts in Sykes, 2000; UN-Habitat, 2016). Vendar pregled obstoječih praks razkriva, da se večina teh osredinja le na fizično prenovo ter v fazah analize, zasnove in izvedbe ne upošteva dovolj ekološke dimenzije (Couch idr., 2011). Natančneje, z vidika urbane ekologije ta ozka usmeritev omejuje vključevanje ekoloških vidikov, s čimer omejuje zmožnost procesov urbane preobrazbe za ustvarjanje koristi, kot so obnova ekosistemov, krepitev biotske raznovrstnosti in izboljšano zagotavljanje ekosistemskih storitev (Alberti, 2008).

Urbana regeneracija se je tradicionalno nanašala na fizično, gospodarsko in družbeno revitalizacijo nazadujočih urbanih območij s strategijami ponovnega razvoja in naložb, vezanih na kraj (Roberts idr., 2017). Čeprav so politike urbane regeneracije – pogosto osredinjene na fizični ponovni razvoj, gospodarsko revitalizacijo in izboljšave, vezane na kraj – vse bolj vključevale vidike trajnosti, so večinoma ostale osredinjene na izboljševanje obstoječih urbanih razmer, ne pa na preoblikovanje temeljnih razmerij med urbanimi sistemi in ekološkimi procesi (Roberts idr., 2017; Couch idr., 2011). Nasprotno regenerativni razvoj prevzema sistemsko usmerjen vidik, ki si ne prizadeva le zmanjšati okoljske škode, temveč tudi obnoviti in okrepiti regenerativno zmogljivost družbeno-ekoloških sistemov. V urbanih kontekstih je ta vidik oblikoval koncept regenerativnega urbanizma, ki mesta opredeljuje kot aktivne akterje, zmožne ustvarjati neto pozitivne ekološke in družbene izide v antropocenu (Thomson in Newman, 2020). Ta vidik se razlikuje od odpornega urbanizma, ki predvsem poudarja zmožnost urbanih sistemov, da se prilagodijo motnjam in ohranijo funkcionalnost v razmerah negotovosti in okoljskega stresa (Davoudi, 2014). Nasprotno regenerativni pristopi presegajo odpornost, saj dajejo prednost ekološki obnovi, krepitvi delovanja ekosistemov in sistemski preobrazbi (Davoudi, 2014; Thomson in Newman, 2020).

Zato ta študija proučuje, kako je regenerativna urbana preobrazba (RUP) konceptualizirana in integrirana v procese urbane preobrazbe, pri čemer je poseben poudarek na njenih posledicah za načrtovalske okvire, strukture upravljanja in politično usmerjeno odločanje. S sintezo razdrobljenih konceptualnih in metodoloških razprav prek sistematičnega pregleda literature študija pojasnjuje, kako lahko RUP usmerja načrtovalsko prakso. Za uresničitev tega cilja študija obravnava ta raziskovalna vprašanja: 1. Katera so temeljna izhodišča RUP? 2. Katere so ključne komponente RUP? 3. S katerimi izzivi se srečujemo v procesu RUP? 4. Kako je mogoče RUP integrirati v urbanizem? 5. Kako je mogoče meriti uspešnost RUP?

2 Metodološki pristop

2.1 Raziskovalna zasnova

V fazi zbiranja podatkov je bil izveden sistematični pregled literature po smernicah PRISMA, ki obsega štiri faze: identifikacijo, presejanje, preverjanje ustreznosti in vključitev (Moher idr., 2009; Page idr., 2021). Nato so bila pridobljena celotna besedila izbranih člankov in kodirana s programom MAXQDA. Kodirano gradivo je bilo analizirano z refleksivno tematsko analizo, kar je omogočilo prepoznavanje vzorcev pomena v celotnem naboru podatkov (Braun in Clarke, 2021). Rezultati so predstavljeni v razdelku o raziskovalnih izidih.

2.2 Zbiranje podatkov

Za strukturiranje faz zbiranja in analize podatkov v procesu sistematičnega pregleda literature je bila uporabljena metoda v šestih korakih (slika 1). V tem okviru je bila relevantna literatura najprej pridobljena iz podatkovne zbirke Scopus z uporabo predhodnih ključnih besed, na katerih je raziskava temeljila. Pridobljeni članki so bili pregledani, nove ključne besede, ki so bile izbrane iz teh člankov in so bile temelj za raziskavo, pa so bile dodane raziskovalnemu zaporedju, da bi se oblikovala končna iskalna strategija študije. V naslednjem koraku je bilo s to končno iskalno strategijo izvedeno novo iskanje v Scopusu. Avtorici sta pregledali naslove in povzetke 137 člankov, da bi presodili njihovo relevantnost za obseg študije, pri čemer je bilo osemindevetdeset člankov izključenih na podlagi meril, kot so pomanjkanje relevantnosti za urbanizem, nerecenzirane vrste objav in nezadostna obravnava regenerativnih pristopov. Med devetintridesetimi obravnavanimi članki ni bil dostopen le eden, celotna besedila osemintridesetih člankov pa so bila arhivirana.

Iskanje po podatkovni zbirki Scopus je bilo izvedeno 2. marca 2025. Merila, upoštevana pri vključevanju ali izključevanju člankov iz študije, so bila:

1. Objava v revijah, indeksiranih v podatkovni zbirki Scopus: pregled literature je bil izveden z uporabo indeksne platforme Scopus.
2. Vrsta objave kot »članek«: objave, ki niso prestale postopka recenziranja, so bile izključene iz študije.
3. Jezik objave »angleščina«: objave, napisane v drugih jezikih, so bile izključene iz študije.
4. Datum objave članka pred 31. decembrom 2024: ker je bil končni pregled literature izveden v začetku leta 2025, je bila uporabljena ta datumska omejitev; začetna datumska omejitev pa ni bila določena, ker se je koncept regeneracije v literaturi o urbanizmu pojavil razmeroma pred kratkim.
5. Relevantnost za urbanizem: ker se koncept regeneracije pojavlja v več disciplinah, je bilo iskanje literature v Scopusu omejeno na predmetni področji okoljskih znanosti in družbenih ved, ki zajemata raziskave urbanizma.

2.3 Analiza podatkov

Po pridobitvi celotnih besedil osemintridesetih člankov so bile vse študije sistematično uvožene v program MAXQDA in podvržene iterativnemu procesu kodiranja. V prvi fazi so bile začetne kode oblikovane induktivno s podrobnim branjem besedil ter prepoznavanjem ponavljajočih se konceptov, argumentov in analitičnih poudarkov, povezanih z regenerativnim urbanim razvojem in urbano preobrazbo. V drugi fazi so bile te začetne kode pregledane, primerjane in združene na podlagi konceptualne podobnosti in teoretične relevantnosti, ne pa na podlagi pogostnosti pojavljanja.

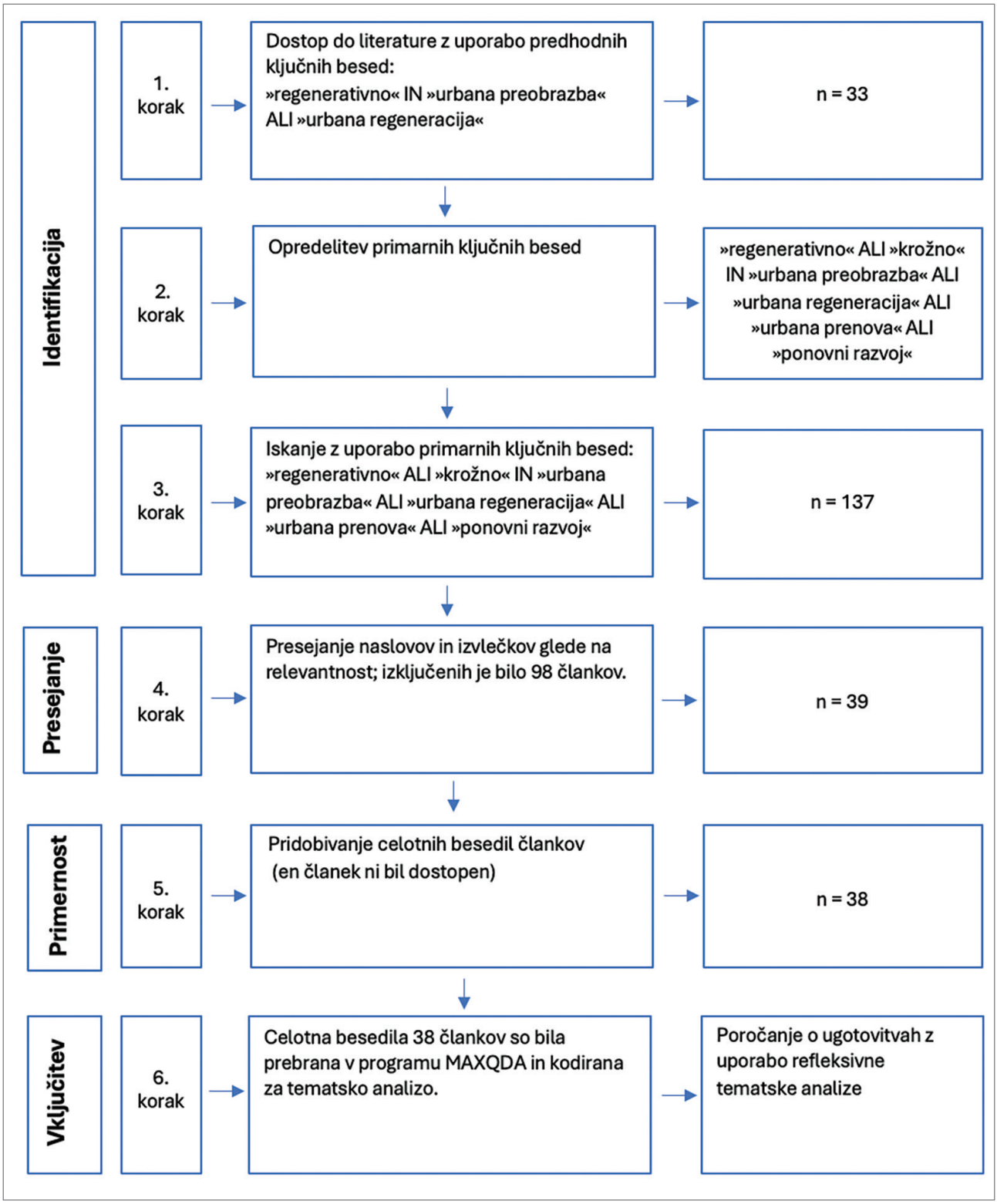
S tem procesom abstrakcije in izpopolnjevanja so bili prepoznani širši vzorci pomena, kar je privedlo do oblikovanja petih glavnih tem in njihovih ustreznih podtem. Te teme tvorijo analitično konstruirane kategorije, ki sintetizirajo ključne dimenzije, poudarjene v pregledani literaturi. Nastala tematska struktura in njene komponente so predstavljene v tabeli 1. Podrobni podporni podatki so dostopni v repozitoriju (Başcan Yüce in Tezer, 2026).

Treba je opozoriti, da je tabela 1 strukturirana tako, da so ločene teme, neposredno izpeljane iz tematske analize, in dodatne podteme, razvite v fazi razprave. Glavne teme in podteme, predstavljene v razdelku z rezultati, induktivno izhajajo iz refleksivne tematske analize pregledane literature in tvorijo vzorce pomena, izrecno opredeljene v naboru podatkov.

Nasprotno podteme, predstavljene v razdelku razprave, niso bile neposredno ustvarjene v procesu kodiranja in tematske analize. Namesto tega so bile razvite interpretativno s sintezo analitičnih ugotovitev s širšimi teoretičnimi razpravami in vrzelmi, opredeljenimi v literaturi. Njihova vključitev je namenjena razširitvi analitičnega okvira s poudarjanjem konceptualnih dimenzij, ki so bile v analiziranih študijah premalo zastopane ali jih ni bilo, vendar so ključne za učinkovito integracijo RUP v načrtovalsko prakso. V skladu s tem je treba te podteme, ki temeljijo na razpravi, razumeti kot konceptualne predloge in ne kot empirične ugotovitve.

2.4 Metodološke omejitve

Kljub sistematičnemu pristopu, uporabljenemu v tej študiji, je treba priznati več omejitev. Prvič, iskanje literature je bilo izvedeno z uporabo podatkovne zbirke Scopus, ki, čeprav je splošno priznana kot ena najobsežnejših akademskih indeksnih platform, morda ne vključuje vseh relevantnih objav, dostopnih v drugih podatkovnih zbirkah. Drugič, pregled se je osredinil na objave v angleškem jeziku, kar je lahko izključilo relevantne študije, objavljene v drugih jezikih. Tretjič, kot pri številnih sistematičnih pregledih literature, ki uporabljajo kvalitativno tematsko sintezo, identifikacija in interpretacija tem vključujeta določeno stopnjo raziskovalske interpretacije. Za ublažitev te omejitve je bil proces kodiranja in tematske kategorizacije izveden sistematično in iterativno, da bi se zagotovili doslednost in transparentnost analitičnega okvira. Kljub tem omejitvam študija ponuja celovit pregled nastajajočega diskurza o RUP in strukturirano podlago za prihodnje empirične in teoretične raziskave.



Slika 1: Faze procesa sistematičnega pregleda literature za študijo (na podlagi pretočnega diagrama PRISMA)

3 Raziskovalni izidi

Tematska analiza pregledane literature je razkrila pet glavnih tem, ki strukturirajo konceptualne in praktične dimenzije RUP. Te teme in z njimi povezane podteme strukturirano predstavljajo, kako literatura konceptualizira izhodišča, komponente, izzive, integracijo v urbanizem in vrednotenje RUP. Nastala tematska struktura in z njo povezane podteme so navedene v tabeli 1.

Tabela 1: Teme in podteme regenerativne urbane preobrazbe, opredeljene z refleksivno tematsko analizo.

Podtema	Glavne teme				
	1. Izhodišče	2. Ključne komponente	3. Izzivi	4. Integracija v urbanizem	5. Vrednotenje
1	Netrajnost trenutnega modela urbanizma	Načela krožnega gospodarstva	Kompleksnost in potreba po interdisciplinarnem pristopu	Integracija v strategije trajnostnega urbanega razvoja	Orodja in kazalniki za ocenjevanje
2	Čezmerno uničevanje ekosistemskih storitev (ES)	Uporaba participativnih in sodelovalnih načrtovalskih pristopov	Visoke investicijske zahteve	Integracija ES v sistem načrtovanja	—
3	Potreba po povečanju urbane odpornosti na podnebne spremembe	Prilagodljiva ponovna uporaba	Sprememba vedenja in družbeno sprejemanje	Zasnova, prilagojena lokaciji, in urbani eksperimenti	—
4	—	Uporaba digitalnih tehnologij	—	—	—
Dodatno	Tehnološki razvoj in aplikacije pametnega mesta	Zmogljivost za medsistemsko integracijo	Zloraba tehnologije	Institucionalno upravljanje in uskladitev politik	Zmogljivost zbiranja podatkov, prilagodljivost različnim merilom, integracija tehnologije

Vir: avtorici.

3.1 Glavna tema: Izhodišče za RUP

Prvo od treh izhodišč, prepoznanih v okviru RUP, je netrajnost trenutnega modela urbanizma. Iz literature izhaja, da problemi, kot so čezmerna poraba neobnovljivih virov (Balletto idr., 2022; Domenech in Borrion, 2022; Girard in Nocca, 2020), nastajanje odpadkov (Williams, 2019), onesnaževanje (Acri idr., 2021; Valenzuela idr., 2018; Lewin, 2013) in prispevanje k podnebnim spremembam (Boeri idr., 2022), skupaj izražajo omejitve prevladujočih praks urbanizma. Več študij tudi kaže, da obstoječi sistemi urbanizma in upravljanja izkazujejo omejeno zmožnost obravnave pomembnih izzivov, povezanih z okoljsko, gospodarsko in družbeno degradacijo (Nowakowska in Grodzicka-Kowalczyk, 2019). V literaturi se tudi vse bolj poudarja potreba po ponovnem premisleku prevladujočih razvojnih modelov in razpravlja o alternativnih okvirih, ki lahko tekoče procese urbanih sprememb integrirajo v sisteme načrtovanja (Herranz-Pascual idr., 2023). Poleg tega se v literaturi pogosto poroča, da so bili prejšnji pristopi k urbani trajnosti nezadostni pri zagotavljanju aktivnega sodelovanja državljanov, zmanjševanju revščine, preprečevanju prehranske negotovosti in učinkovitem obvladovanju neenakosti na urbanih območjih. Kot odgovor na te omejitve se regenerativni urbanizem v literaturi obravnava kot pristop, ki ponuja strateško usmeritev k razvoju trajnostnih in zdravih mest z visoko kakovostjo bivanja (Sala Benites idr., 2023).

Drugo izhodišče, opredeljeno v okviru RUP, zadeva čezmerno degradacijo urbanih ekosistemskih storitev (ES). Prejšnje študije kažejo, da urbano širjenje in človeške dejavnosti izvajajo velik pritisk na naravne ekosisteme, kar vodi v degradacijo in izgubo ES v mestih (Nesticò idr., 2022; Caratelli idr., 2019). Mesta so opisana kot območja, na katerih so naravni sistemi izrinjeni, preostala urbana narava pa je pogosto preoblikovana v močno spremenjene ekosisteme (Thomson idr., 2022). Empirični dokazi iz Al-Aina ponazarjajo to dinamiko: dolgotrajno intenzivno kmetijstvo, urbani razvoj in živinoreja so prispevali k izčrpavanju podzemne vode, zaradi česar so vodonosniki postali neobnovljivi, ekosistemske storitve pa oslabljene (Caratelli idr., 2019). Te ugotovitve kažejo omejitve konvencionalnih pristopov k urbanemu upravljanju voda in krepijo relevantnost regenerativnih perspektiv v urbanizmu. RUP je opredeljena kot pristop, ki si prizadeva ponovno povezati urbana območja z ekološkimi sistemi, podpreti revitalizacijo ekosistemov in zmanjšati nadaljnjo ekološko degradacijo, povezano z urbano rabo.

Tretje izhodišče, opredeljeno v okviru RUP, se nanaša na potrebo po krepitvi urbane odpornosti v kontekstu podnebnih sprememb. Mesta so v literaturi pogosto opisana kot posebej ranljiva za vplive, povezane s podnebjem, kar je povečalo pozornost, usmerjeno v odpornost kot ključno vprašanje v razpravah o urbanem razvoju (Intergovernmental Panel on Climate Change, 2022; UN-Habitat, 2020; Meerow idr., 2016). V študijah se poudarja, da so za obravnavo tveganj, povezanih s podnebjem, potrebni trajnostni in inovativni pristopi, ki integrirajo družbene, gospodarske in fizične dimenzije grajenega okolja (Ahern, 2011; Bühler idr., 2024; Elmqvist idr., 2019; Sala Benites idr., 2023).

3.2 Glavna tema: Ključne komponente RUP

Kot ključne komponente RUP so bile opredeljene štiri podteme. Prva podtema zadeva načela krožnega gospodarstva. Cappellaro idr. (2019) krožno urbano preobrazbo opredeljujejo kot pristop, ki spodbuja uporabo obnovljivih virov in podpira neprekinjeno kroženje materialov prek sistemov zaprte zanke. Isti avtorji poudarjajo tudi, da taki sistemi prispevajo k optimizaciji rabe virov ter so povezani z zmanjšanjem emisij ogljika in ravni onesnaževanja.

Nowakowska in Grodzicka-Kowalczyk (2019) trdita, da je načrtovanje mest po krožnih načelih povezano z večjimi ravnmi samozadostnosti in obnovljivosti. Viglioglia idr. (2021) in Balletto idr. (2022) obravnavajo načela krožnega gospodarstva kot taka, ki imajo potencial za integracijo v več urbanih funkcijah, kadar se urbani problemi obravnavajo z regenerativnega vidika. Williams (2019) predstavlja empirične primere, kot sta recikliranje organskih odpadkov in energetska predelava, ki ponazarjajo, kako lahko krožno upravljanje virov zmanjša pritiske na ekosistemske storitve in prispeva k razvoju regenerativnih urbanih sistemov. Cappellaro idr. (2019) poročajo, da mesta, ki sprejemajo načela načrtovanja krožnega gospodarstva, podpirajo trajnostno rast in krepijo zmogljivosti samoobnove z usklajenim upravljanjem procesov porabe virov in nastajanja odpadkov. Valenzuela idr. (2018) navajajo kvantitativne dokaze iz študij primerov, ki kažejo, da so mesta, upravljana po načelih krožnega gospodarstva, dosegla znatna zmanjšanja nastajanja odpadkov, pri čemer so poročana zmanjšanja s 100 na 21,5 % in nadaljnji potenciali zmanjšanja do 3,5 %.

Druga ključna komponenta RUP, opredeljena v literaturi, je uporaba participativnih in sodelovalnih načrtovalskih pristopov. Bayulken in Huisingh (2015) ter De Medici idr. (2018) poudarjajo, da procese RUP zaznamuje vključevanje več deležnikov, vključno s prebivalci, organizacijami civilne družbe, zasebnim sektorjem in javnimi institucijami. Ti avtorji tudi poudarjajo, da je sodelovanje med temi akterji tesno povezano z učinkovitostjo regenerativnih procesov. Participativni procesi, ki jih izvajajo v ekoloških in družbenih kontekstih, so obravnavani kot mehanizmi, ki deležnike spodbujajo k prevzemanju odgovornosti in krepijo kulturo sodelovanja (Bayulken in Huisingh, 2015; De Medici idr., 2018). LopezDeAsiain in Díaz-García (2020) poročata, da fleksibilni procesi vrednotenja, ki omogočajo interakcijo med strokovnim in lokalnim znanjem, podpirajo razvoj kontekstualno svojevrstnih regenerativnih rešitev. LopezDeAsiain in Díaz-García (2020) prav tako navajata, da začetni korak v participativnem načrtovanju vključuje razvoj zemljevidov akterjev, ki opredeljujejo relevantne deležnike ter izražajo njihove družbene, gospodarske in politične dimenzije.

Sala Benites idr. (2023) poudarjajo, da so participativni procesi v RUP najučinkovitejši, kadar so zasnovani tako, da vključujejo vse relevantne in reprezentativne deležnike, ne pa da delujejo kot posvetovalni mehanizmi, ki služijo posebnim interesnim skupinam. LopezDeAsiain in Díaz-García (2020) poudarjata pomen vzpostavljanja zaupanja med deležniki, Ricci (2022) potrebo po orodjih za sodelovanje, prilagojenih lokalnim kontekstom, Girard in Nocca (2020) razpravljata o vlogi prostorov, ki skupnostim omogočajo ustvarjanje inovativnih odzivov v obdobjih krize, Trzcińska (2021) pa se osredinja na razumevanje dejanskih potreb uporabnikov.

Tretja temeljna komponenta RUP je prilagodljiva ponovna uporaba. Nowakowska in Grodzicka-Kowalczyk (2019), Petruskeviciute (2019), Williams (2019) in Iodice idr. (2020) opisujejo prilagodljivo ponovno uporabo kot pristop, ki zajema več dimenzij, vključno z ohranjanjem urbanih virov, zmanjševanjem odpadkov, revitalizacijo praznih in zapuščenih urbanih območij, varovanjem in ponovno uporabo kulturne dediščine ter podporo procesom prilagajanja podnebnim spremembam. Petruskeviciute (2019) prilagodljivo ponovno uporabo z regenerativnega vidika opredeljuje kot pristop, za katerega je potrebno razumevanje urbanih območij kot dinamičnih in živih sistemov. Ricci (2022) predstavlja empirične primere iz integriranih prenovitvenih projektov, izvedenih na Poljskem, ki kažejo, kako lahko prilagodljiva ponovna uporaba premalo izkoriščenih stavb in prostorov prispeva k revitalizaciji nevarnih območij, okrepi njihove družbene in kulturne funkcije in izboljša urbano kakovost ob ohranjanju zgodovinske dediščine. Ricci (2022) poudarja, da lahko ciklično ponovno vrednotenje praznih nepremičnin in preoblikovanje premalo izkoriščenih stavb za nov namen ustvarita družbene koristi, vključno z zaposlitvenimi možnostmi in izboljšanim zagotavljanjem storitev.

Četrta temeljna komponenta, opredeljena v okviru RUP, je uporaba digitalnih tehnologij. Franchino idr. (2022) proučujejo uporabo digitalnih tehnologij v procesu RUP, zlasti v povezavi z ocenjevanjem vplivov na okolje in zagotavljanjem informacij, Viglioglia idr. (2021) pa se osredinjajo na njihovo vlogo pri simulaciji scenarijev in podpori načrtovanju. Razpravljajo o tem, kako lahko digitalne tehnologije podpirajo učinkovitost rabe virov z olajševanjem sprejemanja regenerativnih vedenjskih vzorcev in omogočanjem učinkovitejšega delovanja urbanih sistemov.

Viglioglia idr. (2021) digitalna orodja povezujejo z obvladovanjem kompleksnosti procesov krožnega gospodarstva ter izboljševanjem učinkovitosti v fazah zasnove, gradnje in obratovanja, Franchino idr. (2022) pa poudarjajo vlogo digitalizacije pri obnovi in prenovi urbane dediščine. Empirične aplikacije digitalnih orodij dodatno ponazarjajo te dinamike. Programska oprema Building Information Modelling (BIM), razvita

in preizkušena v italijanski študiji primera, je na primer omogočila prepoznavanje ekoloških vplivov stavb v fazi zasnove z digitalnim modeliranjem, kar je zagotovilo revizije zasnove, ki zmanjšujejo ekološko škodo (Franchino idr., 2022). Taka digitalna orodja, uporabljena na različnih prostorskih ravneh, bi lahko prispevala k bolj informiranim in učinkovitim procesom odločanja, saj omogočajo primerjavo načrtovalskih scenarijev in okoljskih vplivov, povezanih z njimi.

3.3 Glavna tema: Izzivi v procesu RUP

V literaturi se dosledno opredeljuje kompleksnost kot osrednji izziv v procesu RUP in poudarja, da je RUP po svoji naravi interdisciplinarna. Ta kompleksnost izhaja iz potrebe po vzpostavitvi učinkovite interakcije znotraj urbanih sistemov, sestavljenih iz več družbeno-tehničnih struktur, vključno s skupno produkcijo novih oblik znanja, prilagajanjem institucionalnih okvirov in skladnim usklajevanjem teh procesov (Gianfrate idr., 2020). Della Spina (2019) opozarja na težavnost doseganja stabilnih interakcij med lokalnimi viri in identiteto naselja prek sinergij med prostori, funkcijami in akterji, vključenimi v procese RUP. Ker regenerativna dejanja hkrati vključujejo geografske, administrativne, ekološke in družbene sisteme, Gianfrate idr. (2020) RUP označujejo kot upravljavsko intenziven proces, za katerega so potrebne močne zmogljivosti usklajevanja, facilitacije in vodenja. Newton in Frantzeskaki (2021) dokazujeta, da je interdisciplinarno sodelovanje bistveno za obravnavo kompleksnih urbanih izzivov. Hkrati Thomson idr. (2022) opozarjajo, da lahko interdisciplinarno delo, če ni skrbno strukturirano, ustvarja ločene, silosne oblike znanja, kar lahko omeji njegov preobrazbeni potencial.

Druga podtema, široko obravnavana v povezavi z izzivi v procesu RUP, zadeva financiranje. Girard in Nocca (2020) poudarjata, da so projekti RUP običajno povezani z visokimi začetnimi investicijskimi zahtevami, zaradi česar je finančna izvedljivost ves čas vprašljiva. Trdita tudi, da je prepričevanje oblikovalcev politik, zasebnih akterjev in javnosti, naj vlagajo v regenerativno preobrazbo, še naprej težavno kljub vse večjemu spodbujanju javno-zasebnih partnerstev in inovativnih finančnih mehanizmov. Izpostavljata tudi, da se ta izziv stopnjuje zaradi omejene razpoložljivosti analitičnih orodij, zmožnih prikazati večdimenzionalne koristi regenerativnih pristopov. Bayulken in Huisingh (2015) poudarjata strateško vlogo javnih financ ter spodbujevalnih mehanizmov pri mobilizaciji zasebnih naložb in podpori regenerativnemu urbanemu razvoju. Empirični dokazi iz Francije na primer ponazarjajo, kako so stanovanjske zadruge, vključene v pobude urbane preobrazbe, izkoristile svoj obseg in institucionalno zanesljivost za zagotovitev dolgoročnih posojil, s čimer so povečale finančno fleksibilnost za prebivalce (Trzcińska, 2021).

Zadnja podtema, povezana z izzivi v procesu RUP, se nanaša na družbeno vedenje in zaznavanje. Onkraj fizične preobrazbe literatura vse bolj priznava, da je RUP tesno povezana s premiki v vsakdanjih praksah, življenjskih slogih in vrednostnih sistemih. Regenerativni pristopi so uokvirjeni kot taki, ki zahtevajo sistemsko usmerjen vidik, ki upošteva celotne življenjske cikle ter postavlja v ospredje alternativne načine proizvodnje in potrošnje (Domenech in Borrion, 2022). Boeri idr. (2022) trdijo, da samo zakonodajni in politični ukrepi ne zadoščajo za doseganje podnebne nevtralnosti, ter poudarjajo nujnost vedenjskih sprememb na individualni, kolektivni in institucionalni ravni, podprtih s participativnimi procesi, ki krepijo okoljsko državljanstvo in podnebno pravičnost. Empirične študije kažejo, da lahko strategije ozaveščanja – od simbolnih intervencij do praks, temelječih na skupnosti – pozitivno vplivajo na vedenjske spremembe in družbeno sprejemanje regenerativnih pristopov (Boeri idr., 2022). Dokazi iz Italije na primer kažejo, da so prakse krožnega gospodarstva, vključno s skupnostnimi vrtovi, sodelovalnimi pobudami in lokalnimi proizvodnimi zmogljivostmi, prispevale k pozitivnim premikom v družbenem vedenju (Cappellaro idr., 2019). Nasprotno druge študije trdijo, da čeprav lahko administrativni posegi začasno vplivajo na individualno vedenje, take spremembe verjetno ne bodo vzdržne brez podpore na znanju temelječih tehnoloških infrastruktur (Newman, 2020). V skladu s tem novejše raziskave poudarjajo potencial digitalnih orodij in interaktivnih mehanizmov – kot so igrifikacija, svetovanje in povratne informacije v resničnem času – za pospeševanje vedenjskih sprememb in krepitev tradicionalnih strategij, temelječih na znanju (Viglioglia idr., 2021).

3.4 Glavna tema: Integracija RUP v urbanizem

Literatura integracijo RUP v strategije trajnostnega urbanega razvoja vse bolj opredeljuje kot pomembno dimenzijo vgrajevanja regenerativnih načel v prakso urbanizma. Obstoječe študije kažejo, da je taka integracija tesno povezana s potrebo po obravnavi kompleksnosti obstoječih urbanih tkiv, vključno s strukturnimi, družbenimi in ekološkimi dimenzijami (Franchino idr., 2022; Viglioglia idr., 2021; Bayulken in Huisingh, 2015).

Aplikativne študije urbane regeneracije poudarjajo tudi pomen sodelovalnih in večakterskih okvirov pri vgrajevanju načel trajnosti v načrtovalske procese (Idrizbegović Zgonić idr., 2024). Girard in Nocca (2020) opisujeta urbanizem kot ključen instrument za premik urbane organizacije od linearnih razvojnih modelov k bolj krožnim in regenerativnim konfiguracijam. Fabi idr. (2021) ter Girard in Nocca (2020) poudarjajo, da je sprejemanje celostnih načrtovalskih pristopov, ki obravnavajo družbene, gospodarske in okoljske dimenzije, skupaj z vključevanjem ciljev trajnostnega razvoja in strateških načrtovalskih

okvirov temeljni korak pri integraciji regenerativnih strategij v procese urbanizma. Bellato idr. (2024) so prepričani, da lahko regenerativni pristopi, zlasti v turistično usmerjenih kontekstih, podpirajo procese preobrazbe, vezane na kraj, prek večakterskega sodelovanja in regeneracije družbeno-ekoloških sistemov.

V literaturi so predstavljeni tudi izzivi, povezani s povezovanjem kompleksnih procesov prek različnih urbanih tkiv. Viglioglia idr. (2021) jih opisujejo kot take, ki zahtevajo poglobljeno analizo obstoječih urbanih problemov in strukturnih kompleksnosti in trajno sodelovanje med strokovnjaki iz različnih disciplin. Petruskeviciute (2019) ter Cappellaro idr. (2019) poudarjajo, da sta varovanje in krepitev naravnih sistemov sestavna dela strategij trajnostnega urbanega razvoja. Trdita tudi, da je oslabljen odnos med urbanimi populacijami in urbanimi ekologijami mogoče okrepiti s širjenjem zelenih površin in ponovno integracijo narave v mesto, podprto s praksami, kot so skupnostni vrtovi in druge sonaravne rešitve.

Trzcińska (2021) in Williams (2019) opredeljujeta energetsko učinkovitost kot dodatno dimenzijo integracije z vidika urbanizma. Poudarjata vlogo politik prometnega načrtovanja, ki dajejo prednost energetsko učinkovitim sistemom javnega prevoza ter spodbujajo hojo in kolesarjenje kot ključni strategiji za zmanjševanje urbane porabe energije. Newman (2020) širšo razširitev obnovljivih virov energije, zlasti sončne energije, opredeljuje kot dejavnik, ki prispeva k RUP in dolgoročni urbani odpornosti.

Druga podtema, opredeljena v literaturi, zadeva integracijo ekosistemskih storitev (ES) v sisteme urbanizma. Thomson idr. (2022) RUP opredeljujejo kot pristop, ki si prizadeva obnoviti, okrepiti in aktivno proizvajati ES v urbanih okoljih prek ukrepov, kot so širjenje zelene infrastrukture, varovanje vodnih ciklov in podpiranje urbane biotske raznovrstnosti. Poudarjajo tudi, da se v mestih, kjer so bili naravni sistemi degradirani zaradi urbanizacije, uporabljajo interdisciplinarne presoje za identifikacijo ekološke škode, čemur sledijo načrtovalski posegi, usmerjeni v ponovno vzpostavljanje in krepitev razmerja med urbano obliko in funkcijami ekosistemov. Girard in Nocca (2020) opisujeta urbanizem kot ključni mehanizem za varovanje naravnih sistemov in ustvarjanje prostora v urbanih območjih, kjer se narava lahko regenerira in množi. Nesticò idr. (2022) navajajo empirične primere, ki kažejo, da lahko mesta, načrtovana z integriranimi in robustnimi omrežji zelene infrastrukture, delujejo kot proizvajalci ekosistemskih storitev ter prispevajo k reaktivaciji opuščenih območij, širjenju družbenih in rekreacijskih prostorov ter izboljšanju urbane kakovosti življenja in družbene blaginje. Tatlić idr. (2024) proučujejo kazalnike urbanih zelenih površin in dokazujejo, da se podatkovno podprta orodja za vrednotenje vse pogosteje uporabljajo v načrtovalskih procesih, vendar njihove ugotovitve tudi razkrivajo, da taki pristopi ostajajo omejeni pri zajemanju sistemskih in regenerativnih dimenzij urbane preobrazbe.

Zadnja podtema, obravnavana v literaturi, se nanaša na zasnovo, prilagojeno lokaciji, in urbane eksperimente, zlasti prek kontekstualno občutljivih oblikovalskih strategij in pilotnih intervencij, ki preizkušajo regenerativne rešitve na lokalni ravni. LopezDeAsiain in Díaz-García (2020) kažeta, da primerjalne analize primerov urbane regeneracije po Evropi izpostavljajo, kako na izide regenerativnih pobud pomembno vplivajo lokalne razmere in značilnosti posamezne lokacije. Skladno s tem Gianfrate idr. (2020) RUP opisujejo kot pristop, ki zahteva fleksibilne in večravninske pristope, ki integrirajo značilne družbenokulturne, podnebne in strukturne značilnosti vsakega urbanega konteksta. Girard in Nocca (2020) pojasnjujeta, da si prakse urbane preobrazbe, utemeljene v krožnih modelih, prizadevajo zmanjšati gospodarske, okoljske in družbene stroške, hkrati pa izboljšati obstoječe urbane razmere.

Urbani eksperimenti so pogosto poudarjeni kot pomembni instrumenti za preizkušanje in operacionalizacijo regenerativnih idej. V literaturi so označeni kot kompleksni, vendar zelo produktivni procesi, ker se izvajajo v resničnih okoljih, ki jih ni mogoče v celoti nadzorovati, ter ker aktivno vključujejo družbene akterje v začetnih in izvedbenih fazah (Newton in Frantzeskaki, 2021). Ponazoritveni primeri vključujejo projekt Buiksloterham v Amsterdamu, začet leta 2015 na podlagi strategije, ki jo je razvila organizacija Metabolic ter je bila izvedena v sodelovanju z več kot dvajsetimi javnimi in zasebnimi akterji. Nowakowska in Grodzicka-Kowalczyk (2019) projekt Buiksloterham opisujeta kot urbani laboratorij, v katerem se krožne razvojne strategije izvajajo prek zahtev za trajnostne gradbene prakse, uporabo predelanih materialov, napredne sisteme ravnanja z odpadki in vodo ter razvoj obnovljivih in samozadostnih energetskih rešitev, podprtih s sodelovanjem med več javnimi in zasebnimi akterji. Projekt je opisan kot urbani laboratorij, cilj katerega je preoblikovati območje v krožno in trajnostno četrt z dolgoročnimi cilji, usmerjenimi v zmanjšanje okoljskih izgub in doseganje regenerativne rabe virov do leta 2050 (Nowakowska in Grodzicka-Kowalczyk, 2019). Podobno Al-Ansari idr. (2024) proučujejo primer regeneracije na ravni soseske v Dohi ter prikazujejo, kako lahko kontekstualno svojevrstne načrtovalske intervencije obravnavajo prostorske in infrastrukturne izzive v hitro urbanizirajočih se kontekstih.

3.5 Glavna tema: Vrednotenje RUP

Bayulken in Huisingh (2015) poudarjata pomen merjenja in spremljanja učinkov RUP kot sredstva za prepoznavanje izzivov in informiranje prilagoditvenih izboljšav v celotnem procesu preobrazbe. O vrednotenju uspešnosti razpravljata v

povezavi s celovitimi ocenjevalnimi okviri, ki združujejo več kazalnikov in komponent vrednotenja ter obravnavajo dimenzije, kot so trajnostnost, zdravje ekosistemov in družbeni vplivi. Navajata tudi, da se večina orodij in metod za ocenjevanje, ki se trenutno uporabljajo v procesih urbane preobrazbe, osredinja predvsem na optimizacijo ravni porabe virov, ne pa na zajemanje neto pozitivnih ali regenerativnih vplivov, ki upoštevajo ekološke izgube in potencialne izravnave. Williams (2019) trdi, da je le omejen delež kazalnikov, ki se običajno uporabljajo v poročanju o trajnostnosti, primeren za vrednotenje procesov regenerativne preobrazbe. Girard in Nocca (2020) poudarjata potrebo po ocenjevalnih okvirih, ki bi regenerativne vplive izrecneje vključili v vrednotenje projektov urbane preobrazbe. Prepričana sta tudi, da imajo taki okviri koristi od dinamične strukture, ki sčasoma integrira ocenjevanje, spremljanje, in kadar je potrebno, prilagoditveno revizijo.

Več študij je predlagalo orodja za ocenjevanje, zasnovana za obravnavo te vrzeli. Fabbricatti in Biancamano (2019) sta razvila okvir vrednotenja urbane regeneracije za zgodovinska urbana tkiva, temelječ na kazalnikih krožnosti, produktivnosti in odpornosti. S proučevanjem napetosti med ohranjanjem in krepitvijo identitete v zgodovinskih kontekstih skozi lečo, usmerjeno v odpornost, njuna študija kaže, da se lahko produktivne krožne dinamike pojavijo v procesih regenerativne prenove, kadar se uporabljajo merila za vrednotenje, usmerjena v odpornost. Podobno je Williams (2019) uvedel okvir uspešnosti, sestavljen iz vzvodov, ukrepov in izidov, za proučevanje razvoja »krožnih zmogljivosti« pri regeneraciji pristaniškega kompleksa, ki je bil empirično preizkušen v kontekstu projekta ponovnega razvoja pristanišča v Stockholmu. Pred kratkim so Sala Benites idr. (2023) predlagali ocenjevalno orodje Regenerative Circularity for the Built Environment (RC4BE), ki obsega 136 meril, opredeljenih z dvostopenjsko metodo Delphi. Namen tega orodja je določiti vrzeli in dinamike v več urbanih ciklih, vključno z ekosistemi, bivalnostjo, infrastrukturo, upravljanjem, sodelovanjem ter lokalnimi gospodarskimi in družbeno-gospodarskimi dimenzijami.

4 Razprava

Medtem ko je več preglednih študij regenerativni razvoj, krožni urbanizem ali v trajnost usmerjeno urbano preobrazbo obravnavalo ločeno, ta študija prispeva k literaturi tako, da RUP izrecno umešča v disciplinarni okvir urbanizma ter jo proučuje s sistematičnega in refleksivnega tematskega vidika. V nasprotju s pregledi, ki predvsem katalogizirajo orodja, kazalnike ali dobre prakse, se ta študija osredinja na to, kako so regenerativna načela konceptualno uokvirjena, operacionalizirana in problematizirana v procesih urbane preobrazbe.

Ugotovitve kažejo, da RUP, čeprav je vse bolj prisotna v teoretični in v prakso usmerjeni literaturi, še vedno nima popolnoma konsolidiranega konceptualnega okvira. Opredeljene vrzeli po temah kažejo trajajoče teoretične in praktične diskontinuitete, ki so obravnavane v nadaljnji razpravi.

4.1 Vrzeli, ki se pojavljajo v izhodiščih za RUP

Čeprav je ta pristop skladen z glavno usmeritvijo literature, omejena zastopanost podteme »tehnološki razvoj in aplikacije pametnega mesta«, opredeljene v tabeli 1, kaže, da dimenzija tehnološke preobrazbe kljub svojemu vse večjemu pomenu v širših urbanih študijah in političnih razpravah v literaturi o RUP še ni bila obravnavana na integriran način. Datta (2015) trdi, da agende pametnih mest pogosto oblikujejo podjetniške in v učinkovitost usmerjene logike, Luque-Ayala in Marvin (2015) pa kritično proučujeta, kako pametni urbanizem običajno poudarja tehnične in menedžerske rešitve. Podobno Colding in Barthel (2017) poudarjata, da so urbani ekološki vidiki v literaturi o pametnih mestih nezadostno obravnavani. Ali digitalne infrastrukture resnično krepijo regenerativno zmogljivost mest ali le reproducirajo sodobno paradigmo trajnostnosti, osredinjeno na učinkovitost, je zato odprto področje razprave. Ta vrzel kaže, da je trenutno znanje o izhodiščih za RUP pretežno ekološko in upravljavsko usmerjeno, pri čemer se tehnologija pogosto obravnava kot sekundarna ali instrumentalna dimenzija.

4.2 Omejena vidnost medsistemske integracije med komponentami RUP

Ugotovitve potrjujejo, da splošno priznane komponente literature o RUP vključujejo načela krožnega gospodarstva, participativne procese, strategije prilagodljive ponovne uporabe in uporabo digitalnih tehnologij, vendar neupoštevanje teme »zmogljivost za medsistemsko integracijo«, predlagane v tabeli 1, med empiričnimi ugotovitvami poudarja pomembno konceptualno vrzel. Čeprav regenerativni pristopi dajejo prednost krepitvi relacijskih dinamik med ekološkimi, družbenimi in tehnološkimi podsistemi, obstoječa literatura te sisteme pogosto obravnava kot ločene domene. Zato so vloge soodvisnosti med cikli energija–voda–odpadki, družbenimi infrastrukturami in mehanizmi upravljanja pri oblikovanju regenerativnih izidov proučene le minimalno. McPhearson idr. (2016) trdijo, da urbane raziskave še naprej razdrobljeno obravnavajo urbane sisteme, Bai idr. (2016) pa zatrjujejo, da so sistemski pristopi v praksi nezadostno operacionalizirani. Hoff (2011) uvaja urbani nexus kot okvir za razumevanje soodvisnosti med sistemi virov, Liu idr. (2007) pa poudarjajo pomen konceptualizacije človeških in naravnih sistemov kot medsebojno povezanih. Ta vrzel vodi k interpretacijam RUP predvsem prek posameznih

domen intervencij, pri čemer zakriva večplastne interakcije, ki podpirajo regenerativno preobrazbo. Tako obrobna obravnava te teme v ugotovitvah kaže, da interdisciplinarni poudarek, ki je v literaturi pogosto izpostavljen, v praksi ni bil preveden v dejansko zmogljivost za medsistemsko integracijo, konceptualno pa ostaja komponenta, obrisi katere še niso popolnoma izraženi.

4.3 Izzivi RUP: nevidna tveganja onkraj dobro znanih vprašanj

Teme, kot so potreba po interdisciplinarnem pristopu, visoke finančne zahteve in družbeno sprejemanje, ki izrazito izhajajo iz ugotovitev, so v literaturi ponavljajoči se izzivi za izvedljivost RUP. Čeprav se tema »zloraba tehnologije«, predlagana v tabeli 1, v študiji ne pojavlja izrazito, vseeno opozarja na pomembno področje tveganja, ki so ga opredelili Ismagilova idr. (2022). Njihova analiza poudarja, da lahko uvajanje podatkovno podprtih tehnologij in pametnih sistemov ustvarja nove oblike odvisnosti in tveganja, povezana z upravljanjem. Vprašanje, ali so sistemi spremljanja, temelječi na senzorjih, ali podatkovno podprta orodja urbanega upravljanja resnično usklajeni z regenerativnimi cilji ali ustvarjajo nova razmerja odvisnosti oziroma ranljivosti upravljanja, v literaturi ostaja neodgovorjeno. Neobravnava tega vprašanja v ugotovitvah kaže, da se izzivi RUP še naprej obravnavajo pretežno v družbeno-gospodarskih okvirih. Hkrati so tehnološka tveganja obrobna celo v teoretični znanstveni literaturi.

4.4 Omejena vidnost institucionalnega upravljanja in usklajenosti politik

Ugotovitve v zvezi z integracijo RUP v procese urbanizma kažejo, da proces poteka po treh glavnih oseh: vključitev v strategije trajnostnega urbanega razvoja, integracija ekosistemskih storitev v sistem načrtovanja in ustvarjanje prostorskih izkušenj, vezanih na kraj. Ta okvir kaže, da regenerativnega pristopa ni treba razumeti le kot dopolnilno orodje, ki podpira okoljske cilje, temveč tudi kot paradigmo, ki preoblikuje način, na katerega se proizvaja in vrednoti načrtovalsko znanje. Vendar so dimenzije institucionalne zmogljivosti, usklajenosti upravljanja in usklajenosti politik – ki se v študiji ne pojavljajo izrazito – kritična vrzel pri integraciji regenerativnih procesov v sisteme načrtovanja. Podobno novejše študije poudarjajo, da procesi urbane regeneracije zahtevajo usklajeno delovanje na več institucionalnih ravneh, vključno z občinami, lokalnimi skupnostmi in regulativnimi organi, da bi se zagotovila učinkovita izvedba (Idrizbegović Zgonić idr., 2024).

Bulkeley idr. (2011) prikazujejo vlogo večravninskega upravljanja in usklajevanja politik pri oblikovanju procesov urbane preobrazbe. Regenerativna preobrazba zato ne zahteva le preoblikovanja prostorskih instrumentov, temveč tudi uskladitev institucionalnega usklajevanja in regulativnih okvirov. Ti vidiki kažejo, da imajo strukture upravljanja kritično, vendar premalo raziskano vlogo pri oblikovanju urbane preobrazbe. To stanje poudarja potrebo po nadaljnjih raziskavah regenerativnega načrtovanja z upravljavskih in institucionalnih vidikov.

4.5 Sodobni izzivi pri merjenju RUP

Različna orodja za ocenjevanje trajnostnih mest in indeksi prilagajanja podnebju, opredeljeni v ugotovitvah, kažejo širjenje literature o merljivosti RUP (Sala Benites idr., 2023; Williams, 2019; Fabbricatti in Biancamano, 2019). Vendar se zdi splošna struktura teh ocenjevalnih orodij zelo razdrobljena. Znaten del teh orodij zahteva dostop do obsežnih naborov podatkov, vendar ostajajo pomembni praktični izzivi glede razpoložljivosti podatkov in zmogljivosti zbiranja podatkov, zlasti na ravni lokalne uprave. Nezmožnost zagotavljanja kontinuitete podatkov zmanjšuje primerljivost kazalnikov, zaradi česar je dolgoročno vrednotenje RUP zahtevnejše. Poleg tega se je prilagodljivost obstoječih orodij različnim merilom izkazala za zahtevno področje. Številni ocenjevalni okviri ne zagotavljajo kazalnikov, ki bi jih bilo mogoče dosledno prenašati med ravnmi soseske, četrti, mesta in regije, s čimer ovirajo razvoj merilne strukture, združljive z večravninsko naravo RUP. Zato morajo prihodnje študije okrepiti ocenjevalne okvire RUP z vidika zmogljivosti zbiranja podatkov, prilagodljivosti različnim merilom in integracije tehnologije.

5 Sklep

Ugotovitve kažejo, da RUP, čeprav pridobiva vidnost, ostaja omejena v svoji konceptualni konsolidaciji in operativni jasnosti. Analiza razkriva, da so ključne dimenzije RUP – zlasti medsistemska integracija, usklajenost upravljanja in merilni okviri – nezadostno razvite, kar vodi v razdrobljeno razumevanje regenerativnih procesov. Te vrzeli nakazujejo, da je RUP še vedno pretežno uokvirjena v ekoloških in projektno usmerjenih vidikih, njene relacijske, institucionalne in večravninske dimenzije pa so premalo raziskane.

Z načrtovalskega vidika rezultati poudarjajo potrebo po ponovni umestitvi RUP kot upravljavsko usmerjene paradigme, ne pa kot nabora posameznih posegov. Napredovanje RUP zahteva močnejšo integracijo med urbanimi sistemi, izboljšano uskladitev med institucionalnimi in regulativnimi okviri ter razvoj prilagodljivih orodij za vrednotenje, zmožnih zajeti dolgoročne in večravninske vplive. Prihodnje raziskave bi se zato morale osrediniti na prevajanje regenerativnih načel v operativne načrtovalske instrumente, politične okvire in sisteme

spremljanja, ki lahko podprejo izvajanje in ocenjevanje RUP v raznovrstnih urbanih kontekstih.

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Izjava o razpoložljivosti podatkov

Nabor podatkov, ki podpira ugotovitve te študije, je javno dostopen v repozitoriju Zenodo na https://doi.org/10.5281/zenodo.19737456. Vključuje seznam pregledanih študij in povezane metapodatke, uporabljene v sistematičnem pregledu literature.

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