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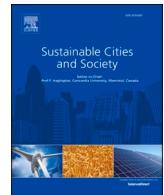
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Stakeholder collaboration in sustainable neighborhood projects—A review and research agenda

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ABSTRACT

Sustainable neighborhood (SN) projects are crucial to alleviate the poor performance in energy consumption and carbon emissions of built environments. However, with several additional interests and priorities relating to sustainability, the job of finding common ground in collaboration becomes more complex compared to conventional housing and neighborhood projects. Moreover, the type of stakeholders involved and the issues they are concerned with change as the project develops. This paper offers a comprehensive overview of empirical-based research found in the intersection between stakeholder collaboration and sustainable neighborhood projects. Our comprehensive systematic review of the past 20 years' extant literature revealed 20 main themes impacting stakeholder collaboration spread over the stages of project development. Building on the various themes, we summarized several factors that support collaboration capacity in SN projects, and that can ultimately lead to different trajectories for sustainability outcomes over time. Furthermore, the review revealed several potential avenues for research, which may help improve our understanding of the mechanics and interaction of stakeholder involvement in SN projects.

1. Introduction

Sustainable neighborhood projects are crucial to alleviate the poor performance in energy consumption and carbon emissions of built environments (UNDP, 2018). However, the neighborhood-scale project development process is embedded in a multi-stakeholder environment and is far from linear. Although much evidence confirms the efficacy of collaboration in solving societal problems and achieving sustainability and zero-emission goals, collaboration for sustainability can be problematic and highly complex in terms of stakeholder configuration and achieving mutual agreements (Bahadorestani, Naderpajouh, & Sadiq, 2019; Sharma & Kearins, 2010; Yang & Yang, 2015).

Sustainable neighborhood projects are local responses to environmental and societal challenges. The concept of the neighborhood covers a group of buildings (proximity) or a group of people (community) (Galster, 2001, p. 2112). Both meanings, proximity and community, have substantial implications for sustainability and energy efficiency (Koch, Girard, & McKoen, 2012). For example, in Freiburg, Germany, the Vauban neighborhood is a recognized model for achieving energy efficiency and renewable energy supply goals on a neighborhood scale

(Fraker, 2013). Research increasingly describes sustainability in neighborhood planning and development (Luederitz, Lang, & Von Wehrden, 2013; Reith & Orova, 2015; Sharifi, 2016; Tanguy, Bretton, Blanchet, & Amor, 2020). Most studies on sustainable neighborhoods cover various concepts relating to the pillars of sustainability, yet these concepts can be incorporated unevenly, depending on the stakeholder interests (Tanguy et al., 2020). To avoid dealing with too many interpretations, we opted to focus on new and redevelopment neighborhood projects that consider environmentally sustainable criteria and goals. Criteria included energy management, greenhouse gas emissions, environmentally-friendly building design, green infrastructure, sustainable mobility, certified sustainable buildings and communities, resource management, and eco-innovation.

Many studies on neighborhood planning and sustainability (Bouzguenda, Alalouch, & Fava, 2019; Too & Bajracharya, 2015) tend to focus on citizen or community participation. However, others concentrate on the organizational aspects of this emerging market. Yet, neighborhoods are realized through projects. The process of stakeholder collaboration deserves more attention from the research community, especially since stakeholder organizations' issues during the development stages of

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sustainable housing products have not been approached systematically by the research community (Yang & Yang, 2015). This want is particularly crucial for sustainable neighborhood projects since collaboration can turn into a taut experience. With several additional interests and priorities relating to sustainability, the job of finding common ground in collaboration becomes more complex compared to conventional housing and neighborhood projects (Sharma & Kearins, 2010; Shi, Yu, Zuo, & Lai, 2016). Moreover, addressing stakeholder collaboration from a project perspective may help bridge, or at least reduce, the gap between what is defined as a sustainable neighborhood and what is delivered (Tanguy et al., 2020).

The present study aimed to systematically conduct a broad literature review of collaboration between stakeholder actors during the development stages of environmentally sustainable neighborhoods (SNs), guided by the following research questions:

RQ1: According to the existing literature, what are the main themes impacting stakeholder collaboration in SN projects? [Review and synthesis]

RQ2: What promising avenues exist for future investigations with a view to advance stakeholder collaboration practice in SN projects? [Research directions]

We offer a comprehensive overview of the empirical-based research found in the intersection between stakeholder collaboration and sustainable urban projects. Specifically, we identify the recurring themes impacting stakeholder collaboration during the development process of SN projects and suggest several research avenues and implications to enhance the collaboration process in SN projects. This paper contributes to the literature on stakeholder collaboration and sustainable urban development. The paper proceeds as follows: in the next section, we examine several literature streams and develop a theoretical framework to help us structure and guide the analysis in Sections 4 and 5. Section 3 presents our research method and systematic review process. Next, we offer the systematic review results, followed by a framework analysis in Section 5. In Section 6, we discuss some of the most important findings of the study and present directions for future research and implications for both researchers and practitioners. Finally, in Section 7, we advance the conclusions and limitations of the study.

2. Stakeholder collaboration in projects

Every time a stakeholder enters or exits a SN project, the level of

complexity changes. Stakeholders are individuals or organizations who can affect or is affected by the project (Freeman, 2010; PMI, 2017). Typical stakeholders in building projects include clients, sponsors, buyers, developers, investors, contractors, suppliers, users, small- and medium-sized enterprises (SMEs), third-parties, government agencies, and regulators. Research often distinguishes between primary and secondary stakeholders. Primary stakeholders (e.g., housing developers) are those who have direct economic and operational involvement in the housing development project, while secondary stakeholders (e.g., a local authority facilitating land) play an important role in the project but are only involved in an ad-hoc way during the development process (Czischke, 2017; Savage, Nix, Whitehead, & Blair, 1991). Collaboration allows stakeholders “to solve a set of problems which neither can solve individually” (Gray, 1985, p. 912). According to Gray (1989), the theoretical argument behind collaboration stems from Ashby's (1960) law of requisite variety. That is, collaboration helps the project to build a sufficient level of internal variety (complexity) commensurate with the complexity or turbulence triggered by external disturbances and challenges.

SNs are planned and produced within project-based systems. Projects are temporary organizations with a business case and time frame (Cattani, Ferriani, Frederiksen, & Täube, 2011; Lundin & Söderholm, 1995), and they are dissolved once the product or service is achieved. Collaboration also has a temporary nature (Roberts & Bradley, 1991). In a project context, collaboration passes through distinctive stages before reaching its conclusion. Each stage consists of different development activities and requires different types and levels of stakeholder involvement. This influences the type of stakeholders involved, as well as the issues the stakeholders are concerned with. Previous research investigated the relationships between the project lifecycle and behavioral issues (Pinto & Prescott, 1988). Following the same logic, we proposed that understanding stakeholder collaboration in projects is also contingent upon the inclusion of the stages of the project lifecycle. Notably, we could have used a general stakeholder management model with a process or stage approach (Preble, 2005), but we preferred the project lifecycle for simplicity and relevance, especially since our context deals with projects. Accordingly, we adopted a project lifecycle approach to guide the analysis process and structure the findings. Gray's work on collaboration (Gray, 1989) was used to describe collaborative activities and understand how collaboration helps stakeholders to deal with their differences and search for solutions relating to sustainability. In what follows, we present the process of stakeholder collaboration using the generic stages of a project lifecycle approach (Table 1).

Table 1
Stakeholder collaboration in a project context.

Stages of the project lifecycle	Collaborative activities	Sources
Conceptualization	Identification of stakeholders and resources Legitimacy and interdependence of stakeholders Common definition of the problem	Bal, Bryde, Fearon, and Ochieng (2013), Gray (1989), PMI (2017), Wood and Gray (1991)
Preparation	Ground rules and agenda setting Joint information search and exchange Exploring options and trade-offs Reaching agreements and closing the deal	Bal et al. (2013), Gray (1985, 1989)
Implementation	Carrying out the actual work Monitoring and ensuring compliance Renegotiation and settlement	Gray (1989), Pinto (2013), PMI (2017)
Closure	Demobilization of stakeholders and resources Hand over to owners or users	Davies, MacAulay, DeBarro, and Thurston (2014), Pinto (2013), PMI (2017)

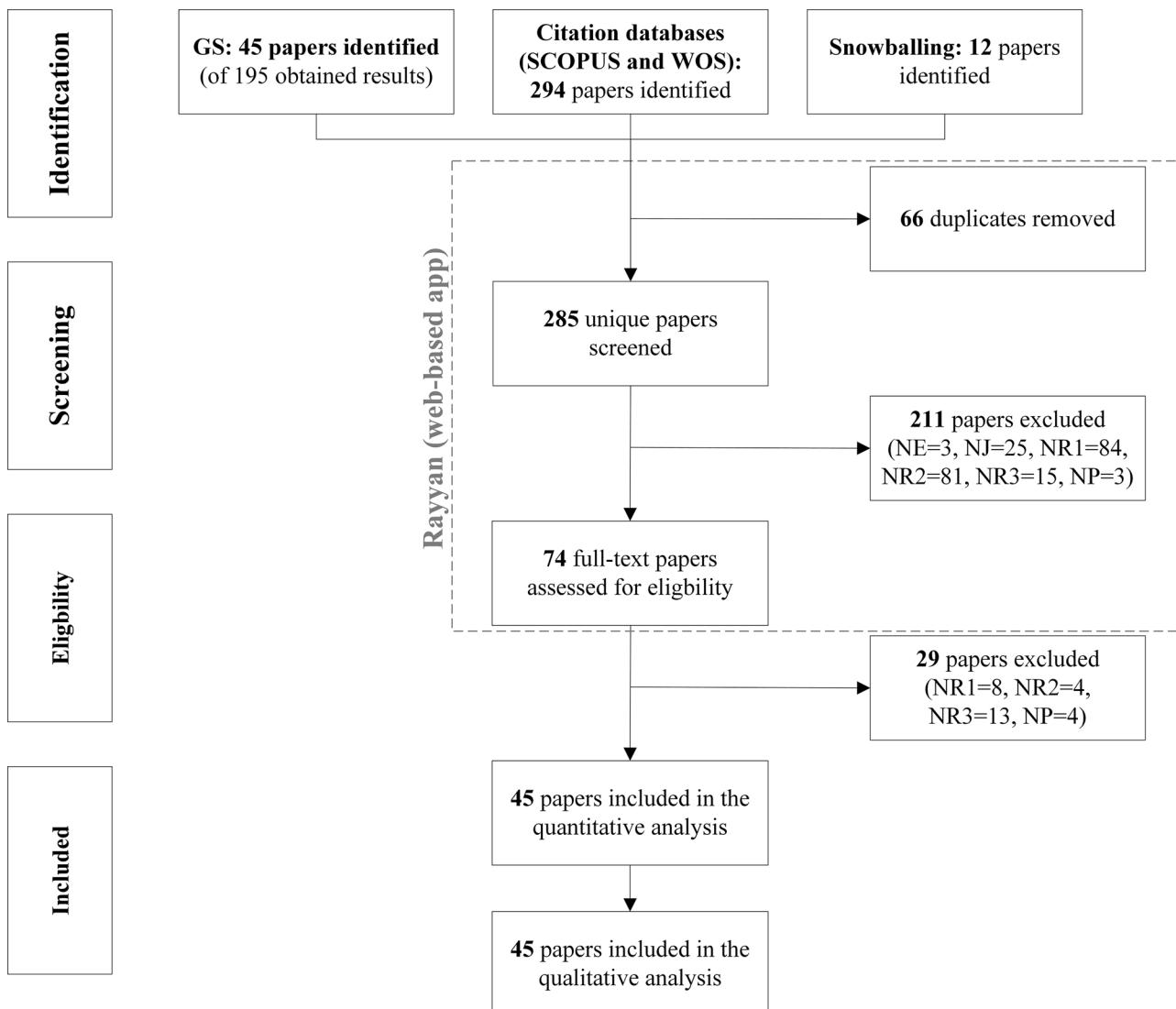


Fig. 1. The PRISMA flowchart illustrates the method of data collection and sorting [adapted from Moher et al. (2009)]. See Table 2 for explanations of the exclusion codes.

The conceptualization stage frames initial expectations, signals the project to a broader audience of stakeholders, and gives the project an explicit identity (Gray, 1989) and legitimacy or what some might refer to as a charter (PMI, 2017). Next, the preparation stage acts as a means of direction setting (Gray, 1989), where stakeholders negotiate and discuss their interests before reaching an agreement. However, the consensus building that occurs in conceptualization and preparation does not necessarily mean that the eventual neighborhood will actually be sustainable as “organizations do not always follow through on their

commitments” (Gray, 1989, p. 91). Stakeholders might ask to renegotiate their involvement in response to technical challenges, contractual problems, or cultural and organizational differences, and the failure to reach an agreement may result in further complications and place the project delivery at risk. Finally, as the project approaches completion, clients’ interest and enthusiasm grows (Pinto, 2013). The closure stage represents an opportunity to improve and transfer learned experiences and knowledge to the broader project ecosystem.

3. Methodology

3.1. Systematic literature review

This paper presents a comprehensive overview of the empirical-based research found in the intersection between stakeholder collaboration and SN projects. We applied a systematic review approach to develop context-sensitive research and ensure rigor and precision of the search process. According to Tranfield, Denyer, and Smart (2003), a systematic review is a transparent process, and in contrast to narrative reviews, it adopts explicit procedures and depends on the clarity of reporting. It can also summarize the evidence in some practice areas, which interested actors (i.e., policymakers) can draw upon (Bryman, 2016). In line with Seuring and Müller (2008) and Tranfield et al. (2003), a four-stage process was developed and used for this review: 1) data collection, 2) sorting, 3) category selection, and 4) classification. In the following sections, we describe the first three stages of our research approach in detail before proceeding to stage four in Section 4.

3.2. Data collection and search strings

We conducted a structured keyword search in the two largest citation databases, Web of Science (WOS) and Scopus, in addition to Google Scholar (GS), to extract papers dealing with SN or sustainable housing (see Table A2 in the Appendix A).

Keywords were developed over several iterations. In doing so, we were able to enhance our search strings and reduce the review's scope to target relevant and context-sensitive research. An initial thematic analysis of the papers, resulted from preliminary investigation in January 2019, which revealed several key topics that needed to be addressed to answer our research inquiry: housing and neighborhood projects, sustainability-related characteristics, and collaboration between stakeholder actors. Searching was not an easy task since the definition of sustainability varies widely across industries and between countries (Hart, 1997). For example, in the urban development and housing industry, some countries interpret sustainability as achieving energy efficiency and zero greenhouse emissions, while for others it can be about achieving culture preservation and housing affordability. However, to avoid an overwhelming number of irrelevant search results, we focused our search on literature about housing and neighborhood projects, aiming for at least environmentally sustainable outcomes. Our search strings consisted of two main parts: the first part was concerned with sustainability in housing and neighborhood projects, while the other focused on stakeholder collaboration. We used various alternatives to ensure proper coverage (see Table A1 in the Appendix A).

The search period covered English papers published in the last 20 years. Urban sustainability is a relatively new concept that started to become popular in the early 2000s (Farreny et al., 2011), and literature describing SN principles began to become popular only in the last decade (Luederitz et al., 2013; Sharifi, 2016). Based on the formed search strings, we conducted two search trials per database and obtained 339 papers. The results from the two trials in each database were merged, where WOS, Scopus, and GS resulted in 77, 217, and 45 results, respectively. Additional papers were also added manually to the initial sample through snowballing due to their thematic relevance. Finally, we fed 351 articles into Rayyan QCRI, a web app for systematic reviews.

Table 2

Exclusion reasons used in the exclusion process.

Exclusion reasons
Non-English (NE)
Not a journal article (i.e., conference papers or book sections) (NJ)
Not related to the development process of sustainable housing or neighborhoods in urban areas (NR1)
Not related to the context of buildings and construction (i.e., tourism, health, etc.) (NR2)
Not (or vaguely) related to collaboration or stakeholder roles (NR3)
Non-empirical papers (NP)

3.3. Sorting and exclusion process

Based on the flow diagram provided by the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) (Moher, Liberati, Tetzlaff, Altman, & Group, 2009), we applied an exclusion process consisting of two main steps: 1) initial screening (Rayyan app¹) and 2) eligibility (manually) (Fig. 1). We developed six exclusion criteria based on the research questions and the targeted context (Table 2). We decided to include only empirical-based literature to extract evidence-based practices related to stakeholder collaboration based on real-world initiatives and projects and eventually produced relevant context-sensitive research. As a result, 306 papers were excluded, leading to a final sample of 45 articles, which we considered for full analysis.

3.4. Category selection

To review and analyze our sample, we used the following general classification categories: year of publication, location, research type or method, research area, data type, and project. The general classification scheme provided an overview of the empirical data in the sample. In addition to these broad categories, we employed a more specific classification for reviewing the papers on SNs, based on the theoretical framework presented earlier in Section 2 "Stakeholder collaboration in projects". The framework was primarily employed in response to the need for better context-sensitive categories. We applied this framework to structure the findings and guide the analysis process, especially since our context deals with projects. We categorized the papers based on whether they discussed the necessary activities comprising each stage or discussing what influences the collaboration process in individual steps. How the different stages of the project's lifecycle are applied and analyzed is further detailed in Section 5.

4. Results

An overview of the results from the review process is shown in Table 3. It presents the primary characteristics of each paper according to the general and specific classification categories, which were decided earlier in Section 3. Our data showed that sustainable and low energy neighborhoods have become increasingly popular over time (Fig. 2). Moreover, the review revealed that SNs seem to be a meeting ground for different research fields (Fig. 3). This confirms the multidisciplinary nature of SNs both in practice and research.

¹ As this was a time-consuming and tedious process, yet critical to the review, we used Rayyan (<http://rayyan.qcri.org>), a web-based app to help us expedite the initial screening of the identified papers.

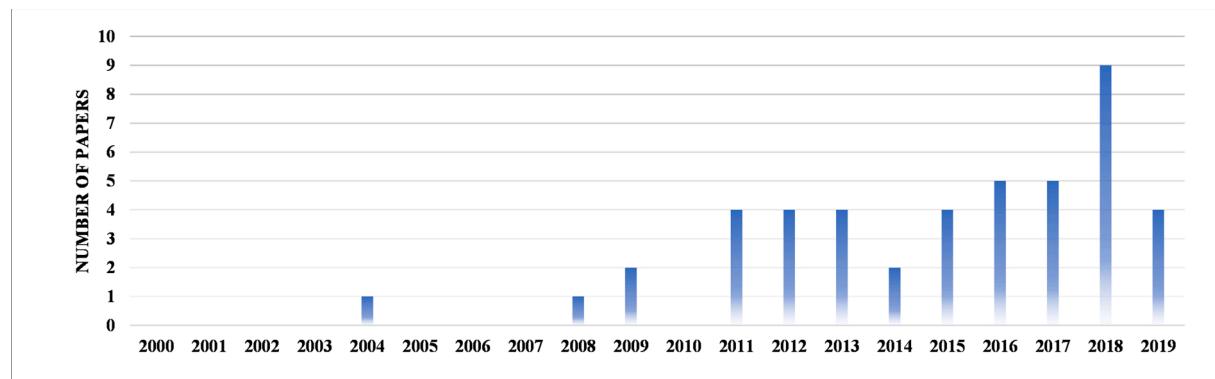
Table 3
Results from the review.

#	Author(s)	Year	Location	Research type	Data type	Research area	Project type	Conceptualize	Prepare	Implement	Close
1	Andersen et al.	2004	AU	Case study	Qualitative	Business Network	New development	x	x	x	
2	Rikers & Hermans	2008	NL, DE, BE	Case study	Qualitative	Social network	Redevelopment	x	x	x	
3	Redmond & Russell	2009	IE	Case study	Qualitative	Sustainable housing	Redevelopment	x	x	x	
4	Gu et al.	2009	CN	Case study	Qualitative	Urban Planning	New development	x	x	x	
5	Farreny et al.	2011	ES	Case study	Qualitative	Urban Planning	New development	x	x		
6	Kellogg & Keating	2011	US	Case study	Qualitative	Business Network	Mixed	x	x	x	x
7	Kyvelou & Papadopoulos	2011	GR	Case study	Qualitative	Urban Planning	General	x	x	x	x
8	Jarvis et al.	2011	UK	Case study	Qualitative	Public participation	Mixed	x	x	x	
9	Gansmo	2012	NO	Case study	Qualitative	Sustainable neighborhood	New development	x	x		
10	Hoppe	2012	NL	Case study	Qualitative	Sustainable housing	Redevelopment	x	x	x	x
11	Georgiadou & Hacking	2012	NL, SE, UK, ES, DE	Case study	Qualitative	Sustainability assessment	Mixed	x	x		
12	Friesen et al.	2012	SE	Case study	Qualitative	Sustainable housing	Redevelopment	x	x	x	x
13	de Jong et al.	2013	CN	Case study	Qualitative	Sustainable cities	Mixed	x	x		
14	Valkering et al.	2013	NL, DE, BE	Case study	Qualitative	Social network	Redevelopment	x	x	x	
15	Zainul Abidin et al.	2013	MY	Mixed	Mixed	Sustainable housing	General	x			
16	Saeid al Surf et al.	2013	SA	Mixed	Mixed	Sustainable housing	General	x	x	x	
17	Ahn et al.	2014	US	Case study	Qualitative	Sustainable housing	New development	x	x	x	x
18	Meehan & Bryde	2014	UK	Statistical	Quantitative	Sustainable procurement	General		x		
19	Chen et al.	2015	US	Case study	Qualitative	Public participation	Redevelopment	x			
20	Copiello	2015	IT	Case study	Mixed	Sustainable housing	Redevelopment	x	x		x
21	Meehan & Bryde	2015	UK	Mixed	Mixed	Sustainable procurement	General		x		
22	Yang & Yang	2015	AU	Mixed	Mixed	Sustainable housing	General	x	x		
23	Copiello	2016	IT	Case study	Mixed	Sustainable housing	Mixed	x	x	x	x
24	Purtik et al.	2016	CH	Case study	Qualitative	Public participation	New development	x	x	x	x
25	Shi et al.	2016	CN	Mixed	Mixed	Sustainable neighborhood	General	x	x	x	
26	Söderholm & Wihlborg	2016	SE	Case study	Qualitative	Urban Planning	General	x		x	x
27	Gustavsson & Elander	2016	SE	Case study	Qualitative	Public participation	Redevelopment				
28	Gan et al.	2017	CN	Statistical	Quantitative	Stakeholder perspective	Stakeholder perspective	General	x		
29	Zedan & Miller	2017	AU	Case study	Mixed	Stakeholder perspective	General	x	x	x	
30	Heberle et al.	2017	US	Case study	Qualitative	Urban Planning	General	x	x	x	
31	Czischke	2017	AT, FR	Case study	Qualitative	Public participation	General	x	x		
32	Marins	2017	BR, DE, SE	Case study	Qualitative	Sustainable neighborhood	New development	x	x	x	
33	Akotia & Sackey	2018	UK	Mixed	Mixed	Sustainable housing	Redevelopment		x	x	
34	Li et al.	2018	CA	Mixed	Mixed	Stakeholder perspective	General	x		x	x
35	Olanrewaju and Tan	2018	MY	Statistical	Quantitative	Sustainable housing	General	x		x	
36	Oliver and Pearl	2018	SE, ES	Case study	Qualitative	Sustainability assessment	Mixed	x	x		x

(continued on next page)

Table 3 (continued)

#	Author(s)	Year	Location	Research type	Data type	Research area	Project type	Conceptualize	Prepare	Implement	Close
37	Rossiter and Smith	2018	UK	Case study	Qualitative	Innovation	New development	x	x	x	x
38	Zhan and de Jong	2018	CN	Case study	Qualitative	Sustainable cities	Mixed	x	x		
39	Zhan et al.	2018	CN	Case study	Qualitative	Sustainable cities	Mixed	x	x	x	
40	Zhang et al.	2018	CN	Case study	Qualitative	Urban Planning	General	x	x		
41	C. Zamora & G. Carballo	2018	ES	Case study	Qualitative	Sustainable neighborhood	Mixed	x	x	x	x
42	Chan & Adabre	2019	CN	Statistical	Quantitative	Sustainable housing	General	x		x	x
43	Nielsen et al.	2019	NO	Case study	Qualitative	Innovation	Mixed	x	x	x	
44	Hagbert & Malmqvist	2019	SE	Case study	Qualitative	Sustainable housing	General	x		x	
45	MacAskill et al.	2021	AU	Case study	Qualitative	Sustainable housing	New development	x			

**Fig. 2.** Overview of publications over time (2000–2019).

5. Analysis

This section highlights collaboration processes among stakeholder actors during the development stages of SN projects. We review the papers using the framework presented in Section 2 “Stakeholder collaboration in projects”, which divided the key activities of stakeholder collaboration into four distinct stages: 1) conceptualization, 2) preparation, 3) implementation, and 4) closure. We applied a thematic analysis process. First, we extracted practices and factors associated with stakeholder collaboration. Next, practices were identified, and factors were categorized per project stage. These were aggregated into 20 final themes (Table 4). In what follows, we present and discuss these themes across the stages.

5.1. Conceptualization

Almost all reviewed papers covered collaboration in relation to project framing. Accordingly, many themes can influence the collaboration process. This includes the involvement of community and influential partners, stakeholder diversity, interests and priorities, public actor capacity, policies impacting stakeholder collaboration in sustainable urban development process, and stakeholder dialogue.

5.1.1. Involvement of the community, including citizens and local organizations

Involving community citizens and local organizations has been emphasized by several studies. Although involvement in the conceptualization stages requires a significant amount of work, evidence suggests that it increases a) public awareness of the benefits and potential of sustainable housing (Chen, Acey, & Lara, 2015; Saeid al Surf, Trigunarsyah, & Susilawati, 2013), b) the attractiveness and outcomes of neighborhood-scale projects (Farreny et al., 2011; Nielsen, Baer, & Lindkvist, 2019; Purtik, Zimmerling, & Welpe, 2016), and c) sales and market performance (Li, Patel, Al-Hussein, Yu, & Gür, 2018). Lack of community involvement hampers the positive outcomes of SN projects. Their absence may lead to mistrust between citizens and local authorities (Jarvis, Berkeley, & Broughton, 2012) and failure, i.e., when the official plans are turned into something different from the citizens’ needs (Canosa Zamora & García Carballo, 2018). Development projects may experience limited involvement when no community yet exists (Oliver & Pearl, 2018). Alternatives would be to involve other neighboring communities or representatives from a larger urban fabric (i.e., a city). The practice of community involvement can vary between developed and developing countries. Zhang, Yung, and Chan (2018) studied the Chinese practice of public participation; they found that residents experienced ineffective and ill-timed feedback from local authorities.

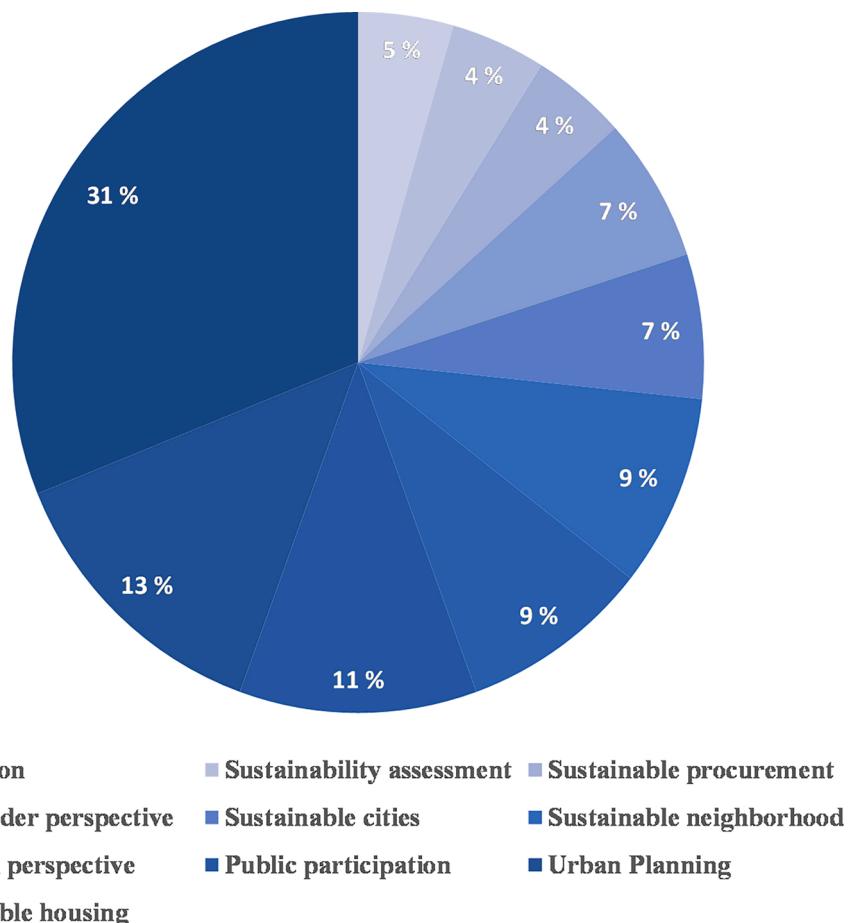


Fig. 3. Overview of publications per research area.

Although the practice of community involvement may, in some cases, create tension and trigger a series of long and protracted negotiations between residents or their representatives and local authorities (Russell & Redmond, 2009), it has various benefits for the development of SN projects, including acceptance and marketing opportunities.

Table 4
Summary of themes impacting stakeholder collaboration in SN projects.

Conceptualization	Involve the community, including citizens and local organizations Involve influential partners Stakeholder diversity The capacity of public actors and intra-government relations Policies impacting stakeholder collaboration in sustainable urban development processes Stakeholder dialog and knowledge exchange Stakeholder interests and priorities
Preparation	Temporal uncertainty Stakeholder consensus on sustainability-related agendas Selection of implementing stakeholders Stakeholder interests balance Innovative and collaborative stakeholder governance
Implementation	Applying the knowledge acquired from previous stages Construction formalities (approvals and standards) Construction delays Learning and knowledge dissemination Coordination and management of stakeholder networks
Closure	User value Business value Diffusion of new knowledge and practices

5.1.2. Involvement of influential partners

Influential actors can positively influence the conceptualization of SN projects. Ahn, Wang, Lee, and Jeon (2014) proposed a development framework, which starts with identifying stakeholders with relevant experience in the development of green affordable housing. Powerful stakeholders often have access to information and can influence others' decisions (Zedan & Miller, 2017). Several studies mention the benefits of involving actors, adopting social entrepreneurship, and venture philanthropy. Copiello (2015) and Copiello (2016) described the dual role played by these stakeholders on the private side of public-private partnerships (PPPs) as developers and managing entities. Purtik et al. (2016) described the catalytic role played by cooperatives and their network in driving the development process. Philanthropic stakeholders can enhance trust with the local community (Heberle, McReynolds, Sizemore, & Schilling, 2017). Influential developers with professional networks in quality urban design and sustainability can also facilitate or enable change (Oliver & Pearl, 2018; Rossiter & Smith, 2018).

5.1.3. Stakeholder diversity

Engaging various stakeholders operating in different contexts is imperative to account for the different perceptions of stakeholders on sustainability performance indicators (Gan et al., 2017). Stakeholder diversity can be interpreted in terms of sectoral identity (public, private, or nonprofit) or jurisdictional geographies (neighborhood, city, regional, national) (Kellogg & Keating, 2011). For example, housing intermediaries facilitate networking and knowledge transfer; construction companies participate in task definition; research institutions contribute to feasibility testing; nonprofit organizations reinforce environmental approaches; and international partners increase funding, experience, and political support (de Jong, Yu, Chen, Wang, & Weijnen,

2013; Hagbert & Malmqvist, 2019; Hoppe, 2012).

5.1.4. Capacity of public actors and intra-government relations

Public actors and intra-government relations are important in the development process of SNs. Studies differentiate between two main public actors: local authorities and central governments. Resourceful local authorities (i.e., those with access to lands and funding) could enable collaboration between stakeholders (Söderholm & Wihlborg, 2016). For example, according to Marins (2017), SN projects tend to be more successful when most of the project land is owned by local authorities, as the full coordination exerted by local authorities allows for higher levels of building and energy performance and increased bargaining power with developers. Local authorities with a higher degree of autonomy or entrepreneurial ability exhibit more proactive behavior and commitment to urban sustainability development (Rossiter & Smith, 2018; Zhang, Yung, & Chan, 2018). Similarly, no on-site ownership and poor support from the central government could weaken municipalities in enacting more ambitious environmental policies (Hagbert & Malmqvist, 2019). It even causes them to withdraw from projects (Hoppe, 2012). For example, local authorities in private-led SN projects could have a relatively minimal role, limited to providing data, attending meetings, and ensuring compliance with city guidelines (Oliver & Pearl, 2018). Several studies highlight the importance of intra-governmental relations and coordination, i.e., between municipal administration, city planners, and politicians for fruitful dialogue and successful implementation (Gansmo, 2012; Nielsen et al., 2019; Söderholm & Wihlborg, 2016).

5.1.5. Policies impacting stakeholder collaboration in sustainable urban development processes

Policies that capitalize on affordable housing investment and energy efficiency solutions may offer a solution for delivering value for various stakeholders and mitigate the issues of split incentives (MacAskill, Stewart, Roca, Liu, & Sahin, 2021). Economic support reduces the innovation risks imposed on ambitious projects (Gansmo, 2012) and liberates resources. Akotia and Sackey (2018) found that most private actors were highly involved in housing regeneration projects, compared to other regeneration projects. This was mainly due to the supporting policies and heavy governmental investment in the regeneration of affordable housing projects. Gu, Vestbro, Wennersten, and Assefa (2009) observed that subsidies from the national government were essential in adjusting the behavior of stakeholders to support investment in environmentally adapted technology. Subsidies can provide political support within housing associations and improve the legitimacy of the project (Hoppe, 2012). Shi et al. (2016) identified the lack of supporting policies as a challenge to sustainable neighborhood development in China. Similar results were also reported in developed countries (Yang & Yang, 2015). Nielsen et al. (2019) highlighted the importance of non-economic incentives and rewards for private developers, such as faster processing times for approvals and a stronger design influence.

Public regulation of the current policies is necessary to avoid confusion between stakeholders arising from parallel legislation and policies (Yang & Yang, 2015). For example, Russell and Redmond (2009) argued that although PPP as a private sector instrument seemed the perfect fit for policymakers, it can be incompatible with developing sustainable communities. Further mismatches between strategy and action were found in the practice of sustainable procurement of social housing (Meehan & Bryde, 2014).

5.1.6. Stakeholder dialog and knowledge exchange

Technical or political difficulties hindering project success are often rooted in the lack of inter-stakeholder communication (Yang & Yang, 2015) or in the absence of certain key actors from the discussion (Farreny et al., 2011). According to Gansmo (2012), a project team succeeds by constantly seeking dialog opportunities between politicians, municipal departments, and other actors to develop robust knowledge and

stretch environmental goals beyond the current regulation. Early dialog between national and local authorities expose or mitigate potential contradictions between municipal planning and national priorities (Nielsen et al., 2019), especially since national infrastructure planning is difficult to integrate into plans for communities.

There are different ways to organize early dialog-based activities. Kellogg and Keating (2011) reported that feasibility studies and stakeholder interviews are used to assess the location and potential project support. Purtik et al. (2016) promoted thematic groups and public forums as a way to spark dialog and test ideas developed in the thematic groups. Neighborhood Sustainability Assessment (NSA) tools (e.g., BREEAM-C) were also reported as effective in sparking dialog between participants (Oliver & Pearl, 2018).

5.1.7. Stakeholder interests and priorities

Many scholars have considered conflicting interests or discrepancies between stakeholders as a critical barrier. The most common conflict stems from the tension between profit-maximization and building a sustainable society (Hagbert & Malmqvist, 2019). Compared to economic benefits, sustainability benefits are hard to see and are often not immediate (Yang & Yang, 2015). Nielsen et al. (2019) described how the development of a neighborhood that is both livable and environmentally sustainable, with high-energy ambitions and quality for citizens, could translate into extra costs. There are high upfront costs imposed on small developers related to assessment tools and green certification (Zainul Abidin, Yusof, & Othman, 2013). Shi et al. (2016) mentioned that poor experience brings significant risks to Chinese companies, which reduces their motivation to apply and develop sustainable technologies. In affordable housing programs, developers tend to pay little attention to incorporating sustainability (Gan et al., 2017), and do not always design and build affordable houses with the homebuyers' preferences in mind; rather, they tend to focus more on profits (Olanrewaju & Tan, 2018). However, on some occasions, private actors are willing to engage in innovative and risk-oriented projects if this improves their market position (Andersen, Cook, & Marceau, 2004).

5.2. Preparation

Once the project convener identifies relevant and interested stakeholders, the behavior of stakeholders moves towards formal involvement. The review reveals several themes that can influence stakeholder involvement, including temporal uncertainty, stakeholder consensus on sustainability-related goals, stakeholder interests balance, selection of implementing stakeholders, and stakeholder governance.

5.2.1. Temporal uncertainty

Four studies addressed temporal uncertainty, which tends to exist in neighborhood-scale projects. Temporal uncertainty captures time-dependent issues that could influence project development and stakeholder collaboration. That is, understanding the different time perspectives linked to the positions and interests of the various stakeholders was vital to understand the complexities incorporated in the development process (Gustavsson & Elander, 2016). Neighborhood construction proceeds sequentially as infrastructure works, including district heating systems and underground car parking, which are installed prior to residential buildings. The temporal development nature of neighborhood-scale projects leads to financial uncertainty for developers, especially first-mover developers, since they will not be able to recover their investment before the new urban neighborhood is fully occupied. Uncertainty about revenue and prolonged paybacks demotivates investors and developers (Shi et al., 2016). Such uncertainty could be reduced through rapid urbanization (Farreny et al., 2011). Another issue associated with temporal uncertainty is the time lag between the preparation and implementation stages, which could last for several years (Nielsen et al., 2019; Farreny et al., 2011; Shi et al., 2016), and in some cases, the solutions realized during the preparation stage might not

be innovative or useful enough at the time of implementation. Temporal uncertainty could damage sustainability-related goals and ambitions, as stakeholders and their priorities change over time.

5.2.2. Stakeholder consensus on sustainability-related agendas

The sustainability-related agenda provides a common ground for stakeholder negotiation. The agenda can incorporate a set of high-level goals based on emission targets, lifecycle energy performance, urban sustainability, and eco-design considerations, including mobility, energy networks, waste, and green areas (Farreny et al., 2011; Georgiadou & Hacking, 2012; Nielsen et al., 2019). Kellogg and Keating (2011) noticed that several stakeholders were active members in environmental sustainability networks and featured green housing in their organizational agendas, which facilitated the formulation of a shared green agenda in the project. This demonstrates the importance of involving stakeholders with shared cognition and knowledge on how to implement sustainability-related agendas in practice (Meehan & Bryde, 2014). Gan et al. (2017) concluded that a consensus on sustainability-related issues is a prerequisite for the development of sustainable affordable housing projects. A good example of well-defined development goals can be found in Ahn, Wang, Lee, and Jeon (2014), where the project had three main goals: affordability, part of the community, and green building features and performance.

However, the formulation of sustainability-related goals is not always straightforward. On some occasions, the cost of achieving some standards is difficult to justify and could demotivate investors and drive potential homebuyers away (Rossiter & Smith, 2018). Oliver and Pearl (2018) noted that the formulation of sustainability-related goals could be hampered when community consultation comes too late in the process. Although a project uses sustainable urban development as an integrative concept based on four main themes (economy, greenery, energy, and community) it was considered abstract (Valkering, Beumer, De Kraker, & Ruelle, 2013). Lack of integrative power across sectors and territories could be the reason behind the formulation of abstract objectives.

5.2.3. Selection of implementing stakeholders

Selecting the most suitable partners and suppliers for collaboration and risk sharing contributes to the effective management of SN projects. Forming procurement consortia with influential partners from different sectors helps access advanced sustainability-related technology expertise and sharing of overhead costs (Andersen et al., 2004; Meehan & Bryde, 2015). Moral imperatives of influential downstream stakeholders (i.e., housing associations) translate into sustainable procurement, which positively impacts the communities served (Meehan & Bryde, 2015). For example, community representatives can be involved in the procurement process, and technical actors can be informed about their preferences to help improve the procurement outcomes (Meehan & Bryde, 2015; Russell & Redmond, 2009). Furthermore, regulators are perceived to have the lowest level of knowledge on sustainable procurement compared to other supply chain players. Moreover, their network does not give them access to contractors and suppliers (Meehan & Bryde, 2015), limiting their ability to draft realistic procurement requirements addressing energy- and sustainability-related goals. Nielsen et al. (2019) showed that some municipalities attempted to secure the establishment of zero-emission neighborhoods by asking private developers for a sustainable mobility system and passive house standards. However, the limitations of national laws and regulations made this impossible.

5.2.4. Stakeholder interests balance

Stakeholders negotiate and discuss interests and differences before formalizing their involvement. Synchronizing the various interests of stakeholders in a complex, multi-stakeholder environment is difficult. Especially when professional stakeholders lack sufficient knowledge and experience related to neighborhood planning (Shi et al., 2016) or if potential demands are overlooked during stakeholder identification in the previous stage. Distrust between local authorities, residents, housing

associations, and energy suppliers can cause deadlocks in decision-making and even the loss of ambitions (e.g., renewable energy) from the project agenda (Hoppe, 2012). Public actors (i.e., central government and local authorities) can contribute in the creation of an appealing environment for business opportunities by facilitating subsidies (Hoppe, 2012) or faster processing times (Nielsen et al., 2019). Maximizing the effectiveness of public actors might require de-siloing public actors involved in housing projects to reduce the level of conflicting requirements in the public sphere (Heberle et al., 2017).

Other studies have recommended various frameworks to arrive at balanced objectives and shared interests between various stakeholders, such as the Neighborhood Sustainability Assessment (NSA) or multi-objective decision-making (Gan et al., 2017). However, if not used properly, framework users risk missing important opportunities for the alignment of visions, the inclusion of non-owner stakeholders, and the formation of effective partnerships (Oliver & Pearl, 2018). Diversification of funding could also be used to balance the interests of different stakeholders (Zhan, de Jong, & de Bruijn, 2018) in which the combination of various financial arrangements could disperse power and reduce conflicts. Diversification of funding comes as a result of stakeholder diversity. It was noted that although the diversification of funding sources creates financial resilience by bringing various stakeholders together, it can cause fragmentation (Kyvelou & Papadopoulos, 2011) where funding parties request specific technical solutions or procedures, without consideration for others' preferences in the project.

5.2.5. Innovative and collaborative stakeholder governance

Several studies (17) emphasized the need for establishing collaborative governance in SN projects. However, some studies were more articulate than others about the meaning of governance. According to Yang and Yang (2015), innovative collaboration should explicate and communicate the mutual benefits for multiple stakeholders from engaging in the development of sustainable housing. Kellogg and Keating (2011) confirmed the need for an innovative approach, guiding the collaboration between environmental and housing organizations to support the development of green neighborhood housing projects. Rossiter and Smith (2018) found that using innovative governance models to run a community energy system can balance the needs of residents, developers, and energy suppliers; however, there is a lack of these models.

Other studies discuss governance in SN projects in terms of integrated contracts, PPPs, and collaborative housing. Zedan and Miller (2017) described how traditional procurement practices encourage isolation and information monopolies. Integrated contracting allows for more integration in the planning, design, and construction stages and facilitates work and forums among all stakeholders (Ahn et al., 2014; Friesen, Malbert, & Nolmark, 2012; Söderholm & Wihlborg, 2016), where the development process is planned cooperatively by the local planning authorities, designers, developers, and contractors. Furthermore, new actors with social entrepreneurship or philanthropic approaches emerged as new members of PPPs (Ahn et al., 2014; Copiello, 2015, 2016). A partnership with philanthropic actors can overcome the lack of entrepreneurial ability of public actors and safeguard the interests of residents (Copiello, 2015). Moreover, new PPP models can balance the interests of various stakeholders (Zhan and de Jong, 2018; Zhan et al., 2018). Such an approach enables residents (landowners) to become project investors, while reducing government expenditure in land acquisition. Consequently, the tensions between local authorities, residents, and real estate developers were reduced.

5.3. Implementation

Successful implementation of the agreed sustainability-related goals requires extensive coordination between stakeholders, including non-implementing and implementing actors. Our review suggested the consideration of several themes when stakeholders are engaged in

implementation-related activities, including putting the acquired knowledge from previous stages into practice, construction formalities, delays, learning and knowledge dissemination, and management of the stakeholder networks.

5.3.1. Applying the knowledge acquired from previous stages

As projects near completion, possibilities for exploration and knowledge development narrow. Knowledge developed at the beginning of SN projects is not necessarily implemented (Nielsen et al., 2019). This also highlights how the configuration of stakeholder changes as the project develops, as responsibilities are handed over, for example, from city planners in municipalities to technical stakeholders in the energy and building sectors.

5.3.2. Construction formalities (approvals and standards)

Before construction activities commence, they must meet formal requirements, including zoning plans, building permits, building standards, sustainability certifications, and other municipal-related issues. Public actors facilitate the decision-making process (Copiello, 2016) and influence the design and inspection approval process (Li et al., 2018). Developers and other technical actors receive some advantages or support (i.e., making intervention properties available at favorable prices) in return for their investment. Sometimes, the political approval of zoning plans is opposed or delayed because of conflicting agendas within the public sphere (Nielsen et al., 2019). Complications can force developers into reducing their level of engagement or prioritize other projects to cut running costs. Shi et al. (2016) identified lacking national standards and assessment tools as a challenge to SN development. Besides achieving quality aspirations, standards and assessment tools help establish mutual understandings or areas of agreement, enabling productive comparison, knowledge exchange, and conflict resolution. Thus, public authorities can address some of the complexity facing developers by simplifying (some) construction formalities (i.e., faster processing times) and introducing standards and assessments tools tailored to local conditions.

5.3.3. Construction delays

Protracted and delayed construction activities lead to dissatisfaction. Further debate and negotiations arise when residents challenge some of the detailed design and planning principles (Russell & Redmond, 2009). Private developers depend on the housing market. Decreasing housing prices could force them to withdrawal, abandon projects, or have time delays (Russell & Redmond, 2009). In some cases, delays could lead to impatient tenants who demand the termination of new energy systems to speed up the project (Hoppe, 2012). Avoiding such delays or abandonment requires having a stable and well-arranged funding system to support the supply and construction activities (Söderholm & Wihlborg, 2016), in addition to active participation from financial and market-based actors (Zhan et al., 2018). Moreover, the engagement of residents and consultants early in the project could shield construction from unnecessary delays (Friesen et al., 2012). In essence, delays create time lags and coordination problems on the neighborhood level and could make some stakeholders rethink their commitment to sustainability, resulting in partial or complete abandonment to environmental and energy ambitions.

5.3.4. Learning and knowledge dissemination

Exchanging experiences and learning during implementation helps to reduce the knowledge gap between stakeholders and avoid performance discrepancies on a neighborhood level. For example, knowledge transfer between designers and contractors supports the incorporation of green building features (Kellogg & Keating, 2011). Some stakeholders facilitate relevant sustainability-related knowledge exchange between stakeholders (Li et al., 2018). Facilitators' can carry information from one actor to another or import new knowledge from the outside environment. Andersen et al. (2004) described how a leading SN developer made great efforts to ensure knowledge transfer, trust, and commitment

among the embedded actors. In this case, we note the dual role played by the lead developer (integrator and facilitator).

Valkering et al. (2013) illustrated the joint learning process between the members of several SN projects located in different geographies. The project's network applied activities and tools contribute to a robust joint learning process. This learning interaction is supported over different knowledge boundary types. For example, project coordination activities at the neighborhood level support learning interactions across sectoral boundaries, including technical and innovative practices. Intergovernmental collaborative networks support urban and regional sustainability (Heberle et al., 2017). Purtik et al. (2016) described how the participatory setup changed from focusing on internal members to external organizations and professionals to obtain missing expert knowledge, suggesting that the way stakeholders interact internally and externally matters.

5.3.5. Coordination and management of stakeholder networks

Constituents of the construction industry are fragmented, which supports widespread blame, opportunistic behavior, conflicting interests, and hinders cooperation (Zedan & Miller, 2017). Controllability in sustainable housing projects is compromised due to design uncertainty and interlinked technical requirements (i.e. durability and energy efficiency) (Gu et al., 2009; Shi et al., 2016). Maintaining a high level of coordination between different stakeholder networks is, therefore, important. Several studies saw an increase in the number of links between different implementation functions, design, construction, and certifying activities to integrate processes and enhance information flow and transparency (Zedan & Miller, 2017). For example, Ahn et al. (2014) noted that an integrated design process could enable different stakeholders to work together to produce efficient and innovative designs. Moreover, virtual platforms served as neutral platforms for communication between stakeholders to meet and coordinate project-based activities (Rikers & Hermans, 2008).

5.4. Closure

Compared to previous stages, closure is by far the least addressed in the reviewed literature in terms of SN projects. Once project deliverables are ready for operation, it is the responsibility of the implementing actors to hand over deliverables to facility management companies and future residents before they exit their agreements and demobilize their resources. We revealed three key influencing themes critical to a successful transition: user value, business value, and knowledge diffusion.

5.4.1. User value

User value measures the satisfaction and benefits that residents gain from the new or renovated housing. The delivered housing must match the residents' expectations and investments, including environmental, affordability, and functionality benefits. This may include a healthier environment, green housing features, and lower operating costs due to enhanced energy efficiency (Chan & Adabre, 2019; Copiello, 2016; Kellogg & Keating, 2011). As buildings become smarter and energy systems more complex, residents become more involved in the management of neighborhood-based systems and are exposed to technical challenges. For example, Ahn et al. (2014) described how the lack of knowledge among residents about green features was overcome by providing post-purchase education and manuals demonstrating how to maintain and operate the green features in their new homes. This was possible due to collaboration between the housing developer and a university.

5.4.2. Business value

Business value is key for developers and other private actors to engage in projects. In the closure stage, some private actors, particularly key developers, can turn their green investments into profits. In the case of new development projects, revenue is mainly generated from selling or renting the new housing units to future residents. Developers may need to perform some commercialization activities to boost the

neighborhood market performance. For example, Purtik et al. (2016) examined participatory formats in the form of neighborhood groups arranged by developers for potential residents. The transfer of knowledge and information to potential buyers can improve the chances of making a sale (Li et al., 2018) and, eventually, the market performance of the whole development. NSA tools also support market performance (Oliver & Pearl, 2018), as the energy-efficiency credentials of these projects attract people interested in sustainable housing and a greener lifestyle (Rossiter & Smith, 2018). In the case of redevelopment projects (i.e., retrofitting), energy-efficiency benefits can be shared between tenants and private developers. However, rent premiums may be insufficient to adopt a profit-oriented approach because rent agreements neglect energy-efficiency criterion (Copiello, 2015, 2016). Developers can also make the development appealing for potential buyers by ensuring social inclusiveness and the timely completion of housing projects. Whether it is a new development or redevelopment, we know little about the profitability of sustainable neighborhood projects.

5.4.3. Diffusion of new knowledge and practices

Stakeholders' opportunities to diffuse the acquired knowledge and practices into the wider project context increases with project closure. Professional actors can advise their organizations, policymakers, and potential clients that are interested in undertaking similar sustainable endeavors (Akotia & Sackey, 2018). Stakeholders' learning from close collaboration influenced their business practices in the housing market (Kellogg & Keating, 2011). Ultimately, the diffusion of newly acquired knowledge will not only improve existing policies and standards but also increase hesitant actors' confidence regarding environmentally and energy ambitious solutions.

6. Discussion

Building on the 20 themes discussed in Section 5, we will highlight some of the most important findings of the study and suggest some directions for future research and implications for both researchers and practitioners.

6.1. Collaboration capacities and trajectories in SN projects

This section presents a preliminary conceptual model based on the various themes and factors that support collaboration capacity in SN

projects, and that can ultimately lead to different trajectories for sustainability outcomes over time. Earlier, we referred to the theoretical argument made by Gray (1989), who stated that collaboration helps the project to deal with environmental complexity. Our comprehensive analysis of the reviewed literature tends to support Gray's theoretical explanation. On the one hand, as more and diverse stakeholders become involved in a SN project and start to combine their resources, they collectively build up and, as argued by Beer (1972), amplify their internal variety, which is necessary to create the conditions and solutions for the SN. The factors from our analysis for driving the amplification of internal variety are shown on the right-hand side of Fig. 4. On the other hand, as our analysis showed throughout the project stages, the consortium of SN stakeholders also has to find ways to attenuate the complexity resulting from working together and from engaging in investments. The factors contributing to this are shown on the left-hand side of Fig. 4. We portrayed the factors driving amplification of variety and the factors attenuating variety as working in a dynamic interactive balancing act, where increases on one end must be met by an opposing force on the other. This dynamic balance between amplification and attenuation represents the project's collaboration capacity.

Viewing the relationship between variety and sustainability implementation over different periods or project stages reveals different stakeholder collaboration trajectories as suggested in the ideal type in Fig. 5. Ideal types are a way to simplify real life complexities to an extent that they are addressable and manageable by theory (Burrell & Morgan, 2017). The four curves in the figure represent the project development stages, and an outward movement denotes the progress of the project across stages. Trajectory one (declining) depicts sustainability goals' deterioration due to the failure to build a sufficient level of collaboration capacity throughout the project stages, addressing stakeholder interests or sustainability demands. Moreover, the declining trajectory could happen due to temporal uncertainty, where stakeholders tend to change their positions and interests over time. Canosa Zamora and García Carballo (2018) provide a good example for how insufficient collaboration created a gap between the projects' sustainability goals and their realizations. In the conserved trajectory, the collaboration continuously neutralizes variety to protect sustainability from deterioration. Increased variety reflects the expansion in the project's network due to involving new actors from the broader supply chain context. The cooperative-led SN project mentioned in Purtik et al. (2016), illustrates how the project's collaboration capacity was expanded to maintain

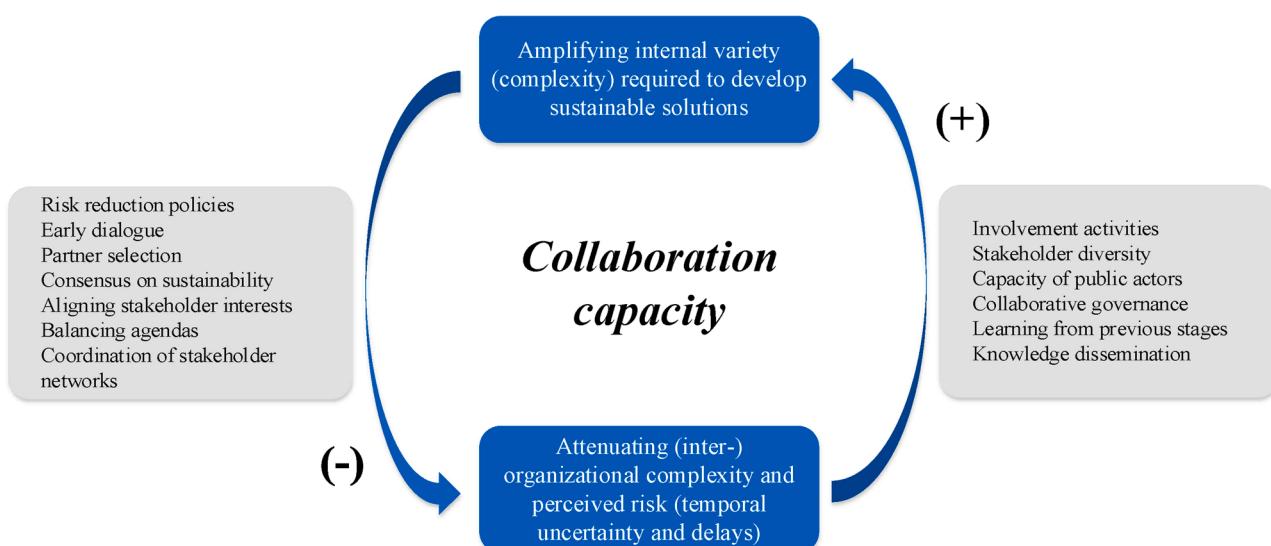


Fig. 4. Collaboration capacity and complexity in SN projects.

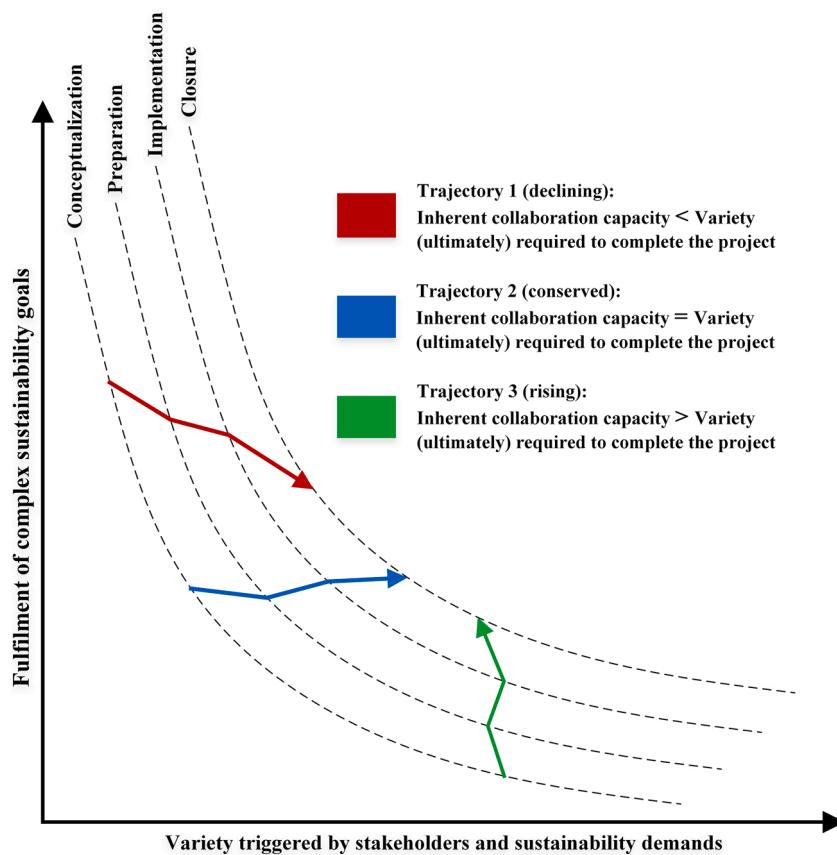


Fig. 5. Ideal type of collaboration capacities and trajectories in SN projects.

sustainability goals. The last trajectory (rising) reflects projects started with low sustainability ambition, often covered by existing regulations and industry standards. A good example for this type is the introduction of solar energy systems in the Sydney Olympic Village mentioned in Andersen et al. (2004). Viewing the collaboration in trajectories over different stages helps keep the project collaboration capacity in check, allowing for continuous calibration between stakeholder interests and sustainability goals.

6.2. Future research avenues

Our review revealed several research areas in the existing literature, that were not adequately addressed in papers on collaboration and SN projects, and which also calls for further research.

6.2.1. Adapting existing project management models for SN projects

The extant literature review drew our attention to the current development models of SN projects and their inherent flaws. Current projects tend to rely on linear development templates without investigating other alternatives. Our analysis showed that SN development is not limited to a top-down (i.e., driven by policy or private sector) or bottom-up (i.e., caused by citizens or housing associations) template. Instead, we believe a hybrid approach is implicitly present, comprised of components from both templates. This suggestion is in line with previous research, promoting models that balance the involvement of various stakeholder groups, including public, private, and people, in real estate projects (Majamaa, Junnila, Doloi, & Niemistö, 2008; Torvinen & Ulkuniemi, 2016).

Therefore, we speculated that there has been a lack of attention given

from project management scholars to neighborhood-scale projects compared to other mainstream construction projects. Since projects are the development process's carrying vehicle, we believe that project management research should play a more significant role in SN research. In turn, as a practical field, SN projects can help the advancement of project management practices. In essence, future project management research should revisit the current organization and management models [i.e. program management, complex product and system (CoPS) projects, stakeholder engagement, and risk management] and adjust them to match the topographies of SN projects. This observation is particularly interesting since studies do not distinguish between managing SN development as one project or a group of related projects. Exploring urban development projects from a multi-project perspective is regarded as a way to develop new theories (Hedborg & Gustavsson, 2020). In doing so, we might create tailored models and practices that address the complexity of stakeholder collaboration in SN projects. Furthermore, knowledge and practices derived from SN projects (i.e., collaboration models) might then be used to advance the theory of collaboration (Gray & Purdy, 2018; Gray, 1989).

6.2.2. Understanding stakeholder transition in SN projects

Our analysis showed that stakeholder involvement changes over time to adapt to the complexity and uncertainty imposed by many actors and multifaceted sustainability-related goals. These dynamics highlight that stakeholder involvement in SN projects is far from linear, and each stage requires different attention and measures. Previous research on stakeholder engagement and sustainable projects has not adequately addressed this (Bal et al., 2013; Mathur, Price, & Austin, 2008). This review showed that several stakeholders' roles are unclear concerning

Table 5
Stakeholder roles in SN projects.

Stakeholders	Conceptualization	Preparation	Implementation	Closure
Central governments	Regulator	Funder	–	–
Local authorities	Convener; Regulator; Planner	Facilitator; Funder; Integrator	Enforcer	Facilitator
Nonprofit housing developers	Convener; Planner	Facilitator; Funder; Integrator	Facilitator; Integrator; Implementer	Facilitator
Philanthropic organizations	Facilitator	Facilitator; Funder	–	Facilitator
R&D institutions	Facilitator; Planner	Facilitator	Facilitator	Facilitator
Private housing developers	Convener	Funder; Integrator	Implementer; Integrator	Finisher
Consulting companies	Planner	Planner	Implementer	–
Design companies	Planner	Planner	Implementer	–
Construction companies	–	–	Implementer	Finisher
Material suppliers	–	–	Implementer	–
Financial institutions	–	Funder	–	–

development stages, where some actors tend to shift their positions or rethink their involvement when moving from one stage to another (Table 5). This observation warrants further investigation to unfold the process of stakeholder transition in the context of SN project development. In particular, we need a better understanding of stakeholder behavior during the closure stage.

In our view, stakeholders, who act as conveners, integrators, and facilitators, have more self-awareness regarding collaborative activities within and across project stages. Conveners may appear to have a dominant influence on the overall project direction, but they tend to adjust their involvement after conceptualization. Facilitators are necessary to keep the collaboration healthy and progressing smoothly throughout the project (i.e., capturing the citizens' needs, scanning for influential partners, leading negotiation on behalf of citizens, orchestrating involvement). In complex projects and products (Davies, Gann, & Douglas, 2009; Hobday, 2000), integrators function as a complexity damper in neighborhood-scale projects by managing and coordinating project activities. However, it remains unclear how these actors (conveners, integrators, and facilitators) negotiate and validate their involvement in terms of sustainability-related goals. Only by understanding the (micro) collaboration dynamics between these actors can we truly uncover the (macro) collaboration dynamics.

6.2.3. Addressing stakeholder alignment

Ill-conceived stakeholder agreements signal misalignment difficulties between stakeholders and, on some occasions, jeopardize the realization of energy-efficiency and zero-emission targets. Alignment strategies guide stakeholders to arrive at collective interpretations of sustainability-related goals. These interpretations then create a negotiated order between stakeholders and form the basis for collaboration in each stage (Gray, 1989). One might say that the preparation stage is where the alignment is supposed to occur since it starts with agenda-setting and ends with agreements. While agreements are arrived at by consensus, the consensus is not necessarily made based on the most sustainable solution. Thus, the alignment and collective interpretations used during the preparation stage do not necessarily lead to sustainability outcomes. Stakeholder alignment in this projected world has yet to be defined. We believe that stakeholder alignment will play a pivotal role in balancing the actors' multifaceted interests if applied systematically throughout the project lifecycle. Further research is needed to synthesize the main ingredients and design principles of alignment strategies.

6.2.4. Advancing the practice of sustainable procurement

This review did not reveal much about procurement best practices in the context of SN projects. Some studies have discussed sustainable procurement in relation to application and social housing. However, apart from PPPs, we still know very little about how project procurement is thought of and planned in complex environments. In particular, there is little knowledge regarding how different purchasing forms, including green procurement, green public procurement (GPP), public

procurement of innovation (PPI), collaborative procurement, private contracting, PPPs, and energy contracting models, co-exist in the same project. GPP, for example, is a growing body of knowledge (Cheng, Appolloni, D'Amato, & Zhu, 2018), but it does not seem to grasp the different system levels found in neighborhood-scale projects. It is possible that by advancing the practice of sustainable procurement to comply with the complexity of SN projects, the benefits or challenges of collaboration become more visible to stakeholders. Hence, we encourage procurement scholars to investigate how the practice of sustainable procurement can be incorporated in SN projects while addressing issues related to stakeholder collaboration. For example, how procurement and supplier selection practices can respond to temporal uncertainty or time-dependent issues, or how GPP, as policy-oriented tools, can be informed to minimize the public sector's inefficiencies in sustainable urban development.

6.2.5. Achieving knowledge integration between development stages

Knowledge acquired at the beginning of SN projects is not necessarily employed in the implementation stage and is often left behind. According to Eslami, Lakemond, and Brusoni (2018, p. 155), "the use of knowledge integration mechanisms is based on a complex interplay between the requirements in the phases of product development ... and the perspective on the source of knowledge." In other words, the responsibilities and tasks are handed over from one source of knowledge (i.e., city planner) to another (i.e., housing developer). In our view, an unpredictable and changing stakeholder landscape (Table 5) likely exposes development process fragmentation and, eventually, knowledge loss between former and newly joint stakeholders. Hence, we underline the need for research demonstrating how knowledge integration mechanisms can be deployed in SN projects to diminish knowledge discontinuities between development stages, especially when moving towards implementation.

6.3. Implications for researchers

SN, as a practical phenomenon, has been utilized in various research areas (Fig. 3), including sustainable housing, business networks, public participation, urban planning, eco-innovation, stakeholder studies, and procurement, among others. However, authors seem to complement their investigations with a multi-perspective approach to comply with the exceptionally multidisciplinary nature of SN projects. For example, papers on sustainable housing have also incorporated other perspectives, including performance criteria, public and private collaboration, or stakeholder engagement. Consequently, this might hinder the advancement of the field. While viewing SN as a meeting ground for different fields is appreciated in practice, the multidisciplinary nature could impose challenges on researchers that want to deepen the topic in specific research areas. This challenge could also hint to its' underutilization in current literature, and the need for cross-fertilization. Hence, we highlight the need to utilize research across multiple fields or 'compartmentalization alignment' to better tackle complexity and cross-

sectoral challenges in SN projects.

6.4. Implications for practitioners

Current stakeholder collaboration practices in projects might be regarded as forward-thinking, considering the increasing number of large-scale and complex projects achieved across sectors. However, in SN projects, the way that stakeholders form constellations and interact remains unclear.

6.4.1. Professional organizations and project practitioners

This paper's insights on stakeholder collaboration will be useful to practitioners both in urban development fields and project-based organizations. Our advice for developers and project practitioners is to be aware of the temporal uncertainty of neighborhood-scale projects. This provides developers with better visibility of their investment plans and financial expectations. Long-term thinking could mitigate the unforeseen consequences in the closure stage. Moreover, unlike other business contexts, the logic of the first-mover advantage is reversed. This means that developers who mobilize early might not be able to recover their investments before the new neighborhood's full occupation. Developers need to be realistic in suggesting solutions, as the solutions proposed during the preparation stage might not be innovative or useful enough at the time of implementation.

Furthermore, project routines and practices used in other mainstream projects might not be usable in SN projects. Thus, we encourage private developers and other project practitioners to frontload the assessment task, including assessing project risks, resources and capacity building, and willingness and ability to collaborate. Practitioners who assess and simulate their involvement are more likely to experience higher efficiencies and fewer conflicts.

6.4.2. Policymakers and regional authorities

This paper also has implications for policymakers and local authorities. The gap between policy aims and implementation measures regarding urban sustainability reflects the inherent problems within the public sphere. This gap could be reduced by either promoting supporting policies, including non-economic policies, such as assuring a rapid urbanization process, or applying tighter building regulations, such as the integration of policy requirements (Sparrevik, Wangen, Fet, & De Boer, 2018). In any case, the focus should always be on reducing the gap between formal and policy-oriented requirements to allow for successful project delivery. Policymakers need to be aware of the differences between robust and distressed housing markets as different risks and challenges require different plans and measures. Another issue that requires attention is the coordination difficulties between governmental bodies, in particular, between the central government and local authority and between the departments within the local authority. Capacity-building activities, including communication and planning seminars, could improve public-public relations, thus, reducing the chance of missing out on emission-reduction opportunities.

Lastly, local authorities, playing the role of conveners, should infuse SN projects with a sense of urgency to encourage collective understanding and actions among developers. Such a strategy could help to align housing developers with a common sustainable concept (Zainul Abidin et al., 2013). This requires stakeholders to be efficient in their explorative efforts during the conceptualization stage without losing their focus on sustainability.

7. Conclusion

This systematic review provides a comprehensive overview of the empirical-based research found in the intersection between stakeholder

collaboration and SN projects. It is the first review of its kind to focus on the development of stakeholder configurations and roles throughout a project life cycle. Our comprehensive systematic review of the extant literature for the past 20 years revealed 20 main themes impacting stakeholder collaboration in SN projects during the process of project development. Based on the various themes and factors contributing to collaboration capacity in SN projects, we proposed a preliminary conceptual model that needs to be validated in future research. Viewing the relationship between variety and sustainability implementation over project stages revealed different collaboration trajectories for sustainability outcomes in SN projects. Furthermore, the literature review revealed several potential avenues for research, which may help improve our understanding of the mechanics and interaction of stakeholder involvement in SN projects.

In general, what we realized from the review was that an increasing number of more diverse involved stakeholders creates new issues or magnifies existing problems related to housing, building, and construction processes across the stages from conceptualization to closure. The stages each represent an arena, where stakeholders may be exposed to different dynamics or where new stakeholders enter or existing stakeholders change their decision horizons. Many of these collaboration issues and problems are relevant to other urban and neighborhood projects that are not pronounced as sustainable, but complex sustainability goals tend to magnify them in SN projects. Some conventional neighborhood projects could take the rising trajectory in an emergent manner, improving their sustainability profile. Our review of the literature revealed several lacunas in the existing research, which are either particular or proliferated in the SN context and which calls for further research and, in some cases, can be fruitfully addressed by more novel theoretical perspectives. These include synthesizing the principles of alignment strategies, advancing the practice of sustainable procurement, and demonstrating how knowledge integration mechanisms can be deployed to diminish knowledge discontinuities between the development stages.

This study has certain limitations. First, although the use of a systematic literature review enabled us to follow a rigorous search and selection process, some relevant studies might have gone unnoticed because of our choice of search terms and strings. However, it is essential to note that the literature on SNs is still evolving, particularly considering the scattered nature of the literature between different research streams. Second, although the empirical papers offered rich data about stakeholders and the development process, it was sometimes difficult to categorize the themes that emerged from literature per project stage due to the lack of sequential descriptions of project events and activities in some papers.

Declaration of Competing Interest

The authors report no declarations of interest.

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Appendix A

Table A1

Search keywords (part 1 AND part 2).

Data source	Trials	Part 1	Part 2
Scopus and WOS (title, abstract or keywords)	Trial 1	("sustainable neighborhood" OR "green neighborhood" OR "sustainable urban neighborhood" OR "eco-village" OR "eco-neighborhood" OR "ambitious neighborhood" OR "energy neighborhood" OR "emission neighborhood" OR "carbon neighborhood" OR "neighborhood project" OR "sustainability in neighborhood")	AND ("collaboration" OR "cooperation" OR "partnership" OR "PPP" OR "public private" OR "stakeholder" OR "participation" OR "alliance" OR "teamwork")
	Trial 2	("sustainable housing" OR "affordable housing" OR "social housing" OR "housing project") AND ("sustainability" OR "energy efficiency" OR "emission" OR "carbon" OR "green")	
GS (title, abstract or body text)	Trial 1	("sustainable neighborhood" OR "sustainable neighborhoods" OR "sustainable neighbourhood" OR "sustainable neighbourhoods")	AND ("stakeholder collaboration" OR "public private collaboration")
	Trial 2	("sustainable housing") AND ("neighbourhood" OR "neighborhood")	

Table A2

Additional notes about methodology.

Stage	Notes
Data collection and search strings	<p>The database selection process. The selection of the WOS and Scopus databases was based on the fact that they are the most extensively used databases for literature search tasks (de Oliveira, Espindola, da Silva, da Silva, & Rocha, 2018; Mongeon & Paul-Hus, 2016), and both of them provide coverage of the research fields of sustainability and social science. For example, in a study by de Oliveira, Marins, Rocha, and Salomon (2017), WOS and Scopus encompassed 95% of the researched articles. Moreover, we performed a preliminary, limited search in January 2019 to test the relevance of various databases, including Sciedirect, Proquest, Engineering Village, Taylor & Francis, Scopus, WOS, and GS. The most relevant results came from the Sciedirect and Taylor & Francis databases. Sciedirect is covered by Scopus as one of Elsevier's products, and Taylor & Francis relies on both Scopus and WOS for citation metrics. Nevertheless, despite the wide coverage of WOS and Scopus, we also used GS to reduce the chance of missing out on relevant results. However, it is important to note that GS's coverage advantage is mostly related to low-impact documents, and about half of its unique citations are reports, theses, book chapters, conference proceedings, and unpublished materials (Martín-Martín, Orduna-Malea, Thelwall, & Delgado López-Cózar, 2018).</p> <p>Differences between databases. In the case of WOS and Scopus, we added certain search parameters, to the search engine of each database. These parameters included document type, field of search, search period, and language. We specified journal articles as document type and excluded reviews since we were targeting empirical-based literature, and we selected "TITLE-ABS-KEY" as the field of search within the papers. In the case of GS, we used a similar approach as with WOS and Scopus, except in the case of document type and field of search; the field of search in GS is "TITLE-ABS-TEXT" by default, and document type covers all types of documents, including non-academic and grey literature. Both, Scopus and WOS offer web-based utilities to structure and export the searches into various formats. On the other hand, GS lacks a "reliable and scalable method to extract data" (Martín-Martín et al., 2018). However, we overcame this issue by using academic search software, Publish or Perish 7 (Harzing, 2007). The length of our search was shortened to several keywords in both trials to avoid an uncontrollable number of irrelevant results.</p> <p>Two search trials. We used Boolean operators to narrow the scope of the search and avoid irrelevant content. For the sake of simplicity, we performed the search in two trials for each database. The first trial was focused on neighborhoods, while the second was focused on housing projects. The decision to include sustainable housing in this review was made after conducting the preliminary search, as we discovered that several housing cases are either neighborhood-scale projects, consisting of two or more related buildings, or an essential part of an existing neighborhood. This allowed us to identify and include more thematically relevant studies, which otherwise could have been missed. Finally, we selected two variations of the search strings to account for the wide array of keywords used in this developing context (see Table A1).</p>
Sorting and exclusion process	<p>Vague abstracts. On rare occasions, we were confronted with short or vague abstracts, which necessitated obtaining the full text and examining certain parts of the text.</p> <p>Document type. Although the document type was set in the databases' search engines to include only journal articles, there were some papers that were indexed as journal articles, but further investigation unveiled that they were not, and the same also happened in the case of language.</p> <p>Rayyan app. There were some benefits to and drawbacks of automating the initial screening process using the Rayyan app. Overall, Rayyan saved us a significant amount of time through its advanced filtering and visual features. Once the citation data were uploaded, different metadata were extracted and grouped under a number of lists. Among those lists were "keywords for include" and "keywords for exclude," and we were able to modify these two lists by removing or adding keywords. They assisted us in exploring and filtering papers. For example, we added the keyword "health," and as a result, the app filtered around 24 papers. This facilitated our task of labeling and selecting papers. Although our overall experience with Rayyan was positive, we experienced some discrepancies with regard to duplicates. The automatic detection feature in Rayyan identified around 59 duplicates. The remaining six duplicates were identified manually. Additionally, we performed random spot checks throughout the screening process to ensure accuracy.</p>
Category selection	<p>Project type. With regard to project type, we differentiated between four types of projects depending on the purpose of the work: 1) new development and new construction projects, 2) redevelopment projects that varied from light renovation and retrofitting projects to demolish and rebuild projects, 3) mixed projects that included both new construction and renovation of existing buildings, and 4) general, in the event that the project type was not specified.</p>

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