

Review

Multi-sector partnerships in the urban development context: A scoping review

Yan Xue^{*}, Alenka Temeljotov-Salaj, Atle Engebø, Jardar Lohne

Department of Civil and Environmental Engineering, Norwegian University of Science and Technology, Høgskoleringen 7A, 7034, Trondheim, Norway

ARTICLE INFO

Article history:

Received 19 December 2019

Received in revised form

7 May 2020

Accepted 14 May 2020

Available online 20 May 2020

Handling editor: Jian Zuo

Keywords:

Multi-sector partnership
 Multi-stakeholder partnership
 Community engagement
 Public-private-people partnership
 Sustainable urban development

ABSTRACT

The existing research on urban development has gradually changed from policy-led management to multi-sector participation in co-design, aiming to create a more livable urban ecosystem. The goal of this paper is to identify the main modes, focuses, and differences among multi-sector partnerships, as well as analyzing the most promising areas of improvement in the existing partnerships modes in the urban development context. The main research method is a scoping review. Five main modes of multi-sector partnerships were identified. These are 'multi-stakeholder partnership', 'public-private partnership', 'public-private-people partnership', 'community-organizational partnerships, and 'end-user-oriented partnership'. Most of them focus on four aspects, namely 'factors affecting participation', 'relationship between participants', 'engagement strategy', as well as 'influence of participation'. The analysis revealed three main areas of improvement: Developing a systematic and effective way to classify the factors affecting participation into a structural system, exploring an efficient method to balance the power of different participants in the participation process, and finding an efficient means to reach a collaborative agreement for different partners.

© 2020 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Contents

1. Introduction	2
2. Research methodology	3
2.1. First , a structured search	3
2.2. Second , expanded keywords and snowballing search	3
2.3. Third , study selection	3
3. Results	4
3.1. The current status of multi-sector partnerships	4
3.2. Differences between various modes of partnerships	4
3.2.1. Multi-stakeholder partnerships (n = 34)	4
3.2.2. Community-organizational partnerships (n = 34)	6
3.2.3. End-user-oriented partnerships (n = 20)	7
3.2.4. Public-private partnerships (n = 14)	8
3.2.5. Public-private-people partnerships (n = 11)	9
4. Discussion	10
4.1. What is the current status of multi-sector partnerships research in urban development?	10
4.2. What are the differences between the various modes of partnerships?	10
4.3. What are the most promising areas of improvements for the existing modes?	11

Abbreviations: PPP, Public-private partnerships; PPPP, Public-private-people partnerships; SEI, sustainable end-user innovation.

^{*} Corresponding author.

E-mail addresses: yan.xue@ntnu.no (Y. Xue), alenka.temeljotov-salaj@ntnu.no (A. Temeljotov-Salaj), atle.engebø@ntnu.no (A. Engebø), jardar.lohne@ntnu.no (J. Lohne).

<https://doi.org/10.1016/j.jclepro.2020.122291>

0959-6526/© 2020 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

5. Conclusion	12
Funding	12
Declaration of competing interest	12
References	12

1. Introduction

Urban planning research emphasizes sustainable development, which aims to improve the quality of citizen well-being and environmental health in a complex urban ecosystem by considering the social, economic and environmental aspects (Panagopoulos et al., 2016; Carmichael et al., 2019). The sustainable development of the environment is typically concerned with natural green areas, urban ecological landscapes, climate change, and levels of pollution (Okeke and Ifeoma, 2019), while sustainable economic development pays attention to job positions, affordability, and welfare for citizens (Yan et al., 2018). Sustainable social development focuses on urbanization rate, urban density, safety, accessibility, availability, and equity (Li et al., 2019). The different aspects include, but are not limited to, these factors.

However, in many large cities, urbanization has had a gradual negative influence on sustainable development, such as reduced air quality, rising house prices, and limited access to natural areas. To cope with the complex challenges and respond to the uncertainty of urban development, a wide range of knowledge and resources are needed from multiple fields. Furthermore, this knowledge and resources often require different types of partners, such as governments, private companies, and citizens, to support the investment, construction, and management of related projects. To respond to this complexity, as well as multiple sciences in the urban developing process, several researchers propose multi-sector partnerships as an efficient approach, which can facilitate cooperation and combine resources from different fields (Thabrew et al., 2009; Robinson and Berkes, 2011).

Multi-sector partnerships are used to describe the participation of multiple sectors (institutions, agencies, individuals), who share resources towards a common goal in a specific project (Amadi and Abdullah, 2011). The partners must originate from at least two sectors, and the resources are generally financing, knowledge, and people (Pittz and Adler, 2016). Multi-sector partnerships have been built for decades, and their use have seen a large increase in recent years, mainly due to the increasing complexity and diversity in different types of areas (Pittz and Adler, 2016). The basic steps are making people aware of common concerns, choosing and engaging partners, as well as aligning and executing strategies (Warhurst, 2014). The partners are chosen according to the kinds of resources they can provide, as well as their values and interests in the project (Le Ber et al., 2010). The decision-making usually comes from multiple sectors, both when forming the strategy and during execution (Erickson et al., 2017).

Multi-sector partnerships can be used in a wide range of areas requiring cooperation using multiple resources. This paper focuses on its use in urban development for deep analysis. For multi-sector partnerships, there exist some differences between the urban development area and other areas. First, the nature of the main goal varies. In other areas, multi-sector partnerships could be mainly focusing on business development, technological innovation, or health problems (Chachoua and Whelan, 2019; Bunn et al., 2009; Rowe, 2018), whereas in urban development the main goal is to achieve a balanced development of social,

economic and environmental sustainability (Nel, 2017; Foth and Adkinsor, 2005). Second, the scope of the involved sectors is different. More sectors are required in urban development compared to many other areas, due to its complexity and the wide range of knowledge and resources required (Fernandez-Anez et al., 2018). The relevant sectors include urban planning institutions, urban development policy-making institutions, investors, developers, design companies, construction companies, maintenance companies, residents, and so on from the urban space to internal properties (Karatas and El-Rayes, 2015). Third, the involvement and decision-making processes are more difficult to achieve than in other areas due to the citizens' participation in multi-sector partnerships in urban development, which aims to promote social sustainability with a bottom-up approach (Li and de Jong, 2017). The main reasons include the citizens' lack of awareness, information, and related knowledge, whereas, in other areas, most partners are related stakeholders with related resources and knowledge (Swapan, 2016; Erickson et al., 2017).

According to existing studies, the benefits of multi-sector partnerships are demonstrated through achieving sustainable urban development from three perspectives. First, it can utilize various sectors' resources. In particular, governments typically have a better understanding of the existing regulations and have the power to make policies to support urban development (Morsink et al., 2011). Meanwhile, private companies have a good understanding of the market (Kościelniak and Górka, 2016), and residents can provide knowledge about the building environment and their needs (Kahila-Tani et al., 2019). Second, it facilitates the information flow among different sectors, which results in new co-production of knowledge and forms shared value (Delannon et al., 2016). Both results are crucial for sustainable urban development decision-making. Finally, it can increase opportunities for urban renewal, as it allows the stakeholders to share the high costs of urban development projects, making them more affordable and reducing individual risk (Tang et al., 2018).

In the urban development process, the related sectors refer to urban planning institutes, architecture designing companies, financing institutions, building material providers, construction companies, refurbishment consulting companies, policy-making departments, management companies, and the residents (Alberg Mosgaard et al., 2016). Choosing the most suitable partnerships with the relevant sectors is crucial. However, there is a lack of summaries of the typical modes concerning choice of sectors for a multi-sector partnership, as well as analyses and comparative studies among the various modes of partnerships, which makes it difficult to choose an appropriate one for a specific project (Liu et al., 2016; Young and Brans, 2017; Knoeri et al., 2016; Li et al., 2018). To solve this gap, this paper will identify the main modes of multi-sector partnerships, and provide analysis concerning their applicable sectors, level of maturity, suitable situations, as well as advantages and disadvantages.

In addition, some multi-sector partnership modes which consider the citizens' participation have not yet been widely applied in the urban development area (Ahmed and Ali, 2006; Knoeri et al., 2016; Delannon et al., 2016). In fact, the participation of citizens is considered an indispensable part of urban

sustainability as they can provide and discuss current issues and needs related to their living environment, which can lead to social sustainability through balancing community interests and creating shared value (Clarke et al., 2019; Loh et al., 2020; Yigitcanlar et al., 2019). Therefore, analyzing the strengths and weaknesses of these modes, as well as proposing improvements, is crucial for the further development of urban planning.

The objective of this study is to explore the main modes of multi-sector partnerships, to analyze the current state, limitations, differences of these modes in details, as well as finding the most promising areas of improvements. This will be done through reviewing the relevant theories and applications of multi-sector partnerships in the urban development context.

The research questions this paper proposes are:

1. What is the current status of multi-sector partnerships research in the urban development context?
2. What are the differences between the various modes of partnerships?
3. What are the most promising areas for improvement in the existing modes?

The remainder of the article is organized as follows: Section 1 demonstrates the definition, characteristics, and importance of multi-sector partnerships for sustainable urban development and the current state of the existing research, and presents the research questions; Section 2 describes the research methodology; Section 3 presents the results of the review; Section 4 discusses the results based on the three research questions; Section 5 concludes the review.

2. Research methodology

This study adopted a scoping review methodology, with the aim of summarizing and analyzing the history and status of multi-sector partnerships in the urban development context, as well as indicating existing main modes and identifying the differences between them. Furthermore, the most promising areas for improvement were identified by comprehensively searching and analyzing existing research.

Before undertaking the scoping review, a basic guideline was set to ensure the correct direction of the review (see Table 1). The guideline limited the scope, sources, and the information to collect on each article. The scope contains timespan, access, and language, while sources are mainly from Science Direct, Web of Science, Google Scholar, Scopus, ACM Digital Library, and IEEE Xplore. The collected information refers to the title, authors, keywords, aim, methodology, results, and recommendation for further study.

The relevant studies were identified through a three-step process: The first step involves a structured search in academic databases, the second step uses the snowballing technique and explores the expanded keywords search and the third step narrows the research down to a controllable scope.

Table 1
A scoping review guideline.

Scope	Sources	Collected information
<ul style="list-style-type: none"> • The Timespan for conducting the review: Six months • Access to the full text • English language 	<ul style="list-style-type: none"> • Science Direct • Web of Science • Google Scholar • Scopus • ACM Digital Library • IEEE Xplore 	<ul style="list-style-type: none"> • Title, author(s), year of publication • Keywords • Aim of the study • Methodology • Results • Recommendation

2.1. First, a structured search

First, according to the definition of multi-sector partnerships, the keywords “multi-sector partnerships”, “different institutions partnership”, and “multi agencies partnership” were used in the databases of *Web of Science*, *Science Direct*, *Google Scholar*, *Scopus*, *ACM Digital Library*, and *IEEE Xplore*. In addition, some newer innovative partnership models use different terminologies, such as co-design, co-creation, institutions, triple/quadruple helix innovation models, and living labs. These keywords were also used for conducting the literature review. To limit the research field, relevant results also had to include the terms “urban ecosystem”, “urban development”, or “urban planning”. Furthermore, the year of publishing was limited to the last five years. This limitation was only applied in the first step for exploring the most important and cutting-edge research on this topic.

2.2. Second, expanded keywords and snowballing search

To identify articles that were not found by the structured approach described above, expanded keywords and snowballing search (Wright and Stein, 2005) were conducted. The research scope was extended by using the newly identified modes, such as “multi-stakeholder partnership”, “public participation”, “community engagement”, “public-private partnership”, “end-user-oriented partnerships” and “public-private-people-partnerships” of multi-sector partnerships as expanded keywords. At the same time, backward and forward citations tracking of these articles were conducted as a snowballing search.

2.3. Third, study selection

When implementing the two steps within the chosen databases, more than 4300 articles emerged. To identify the most relevant literature for the research, the following restrictions were applied:

- Studies before the year 2000 were excluded (important theoretical articles were not excluded). Based on this, relatively new challenges in the related fields could be found.
- Only articles in the *Science Citation Index (SCI)* and *Social Sciences Citation Index (SSCI)* journals were included (important theoretical articles were not excluded). This ensured that studies of relatively high academic value could be found. This step narrowed the study sample to 1300 articles.
- However, a study sample of 1300 articles was still perceived to be too unspecified for providing relevant answers to the research purpose. Therefore, a closer review of these studies was necessary. The titles were assessed, narrowing the number of articles down to 900. The sample was filtered down to 113 studies after assessing the keywords and abstracts.

The scoping process is summarized in Table 2.

Table 2
The scoping process.

Stage	Process	Number of the identified papers	Method
1. Initial structured search	Search for “multi-sector partnership”, “different institutions participation partnership”, “multi agencies participation partnership” AND “urban ecosystem”, “urban development”, and “urban planning”	96	Bibliometric
2. Expanded keywords search	Search for “stakeholder participation partnership”, “public participation”, “community engagement”, and “public-private partnership” AND “urban ecosystem”, “urban development”, and “urban planning”	2130	Bibliometric
3. Snowballing	A snowballing search of the identified papers before	4300	Bibliometric
4. Filtering	Excluded studies before the year 2000	1300	Bibliometric
5. Specification	Qualitative assessment of title	900	Bibliometric + qualitative assessment of title
6. Selection	Qualitative assessment of title, keywords, and abstract	113	Bibliometric + qualitative assessment of title, keywords, and abstract

3. Results

Following the proposed research questions, the final sample is comprised of 113 articles.

3.1. The current status of multi-sector partnerships

The literature review identified five main modes of multi-sector partnerships, namely:

- Multi-stakeholder partnerships
- Community-organizational partnerships
- End-user-oriented partnerships
- Public-private partnerships
- Public-private-people partnerships

The proportions of the main five modes of multi-sector partnerships in the research sample are shown in Fig. 1. ‘Multi-stakeholder partnerships’ and ‘community-organizational partnerships’ both represent 30% of the sample, followed by ‘end-user-oriented partnerships’ with 18% and finally ‘public-private partnerships’ and ‘public-private-people partnerships’, which together represent 22%.

Fig. 2 shows the publishing year of the identified articles. By observing the number of research articles per year, it can be seen that the modes of multi-sector partnerships in urban sustainable development were not widely developed before 2014. After that, related studies steadily increase until 2018, which suggests that multi-sector partnerships are becoming an increasingly important approach for sustainable urban development. Only 3 articles from 2019 are in the sample, as the database search was conducted in early 2019.

Fig. 3 shows the publishing journals of the sample papers. From

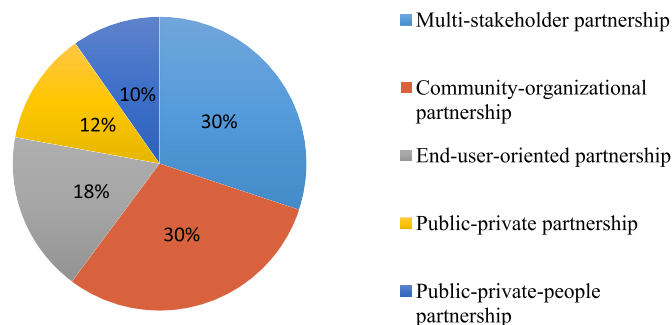


Fig. 1. Percentages of different modes of multi-sector partnerships in the sample.

the figure, we can observe that 37 of the sample articles are published in *The Journal of Cleaner Production*, equaling 33% of the study sample. The journal was found valuable for the further exploration of related research, as it provided a means of identifying interrelated research. Results also show that other journals such as *Cities* and *Building and Environment* have high value for further study. *Cities* represents 17% and *Building and Environment* 14% of the study sample.

Fig. 4 shows the most frequently used keywords in the sample articles. ‘Obstacles and drivers’, ‘engagement’, ‘relationship’, and ‘influence’ are the most popular keywords and can help in determining the most important focus of the research. The ‘Obstacles and drivers’ refers to the barriers and drivers to apply the modes, ‘engagement’ focuses on how to engage related sector to participate in the partnership modes, ‘relationship’ emphasizes the relationship between different sectors, and the influence refers to the impact on the urban sustainable development. In the following, the identified five modes will be analyzed concerning the differences between these modes in terms of these four aspects.

3.2. Differences between various modes of partnerships

The following section corresponds to the second research question, namely searching for differences between the various modes of partnerships. The differences among them will be explained through four main aspects. These are ‘engagement’, ‘relationship’, ‘barriers and drivers’ and ‘influence’, since they are the most frequently observed keywords in the articles (see Fig. 4). At the same time, the theoretical background, corresponding applicable sectors, and methodology of each part will be explored.

Table 3 summarizes the basic characteristics between the five modes concerning the concept, author, participants, and the potential impact it can have on the urban sustainable development. In the following, the detailed information will be analyzed individually.

3.2.1. Multi-stakeholder partnerships (n = 34)

The first mode is multi-stakeholder partnerships, which was developed based on stakeholder theory introduced by Freeman et al. (1984), who identified stakeholders as “any group or individual who can affect, or is affected by, the achievement of the organization’s objectives”. Therefore, the stakeholders include not only the investors but also other groups related to the results. Freeman’s theory stirred interest in multi-stakeholder partnerships research and orientation (Le Feuvre et al., 2016; Bowen et al., 2017; Bissonnette et al., 2018). The applicable sectors include the following groups: financial institutions, governments, municipalities, management companies, customers, employees, suppliers,

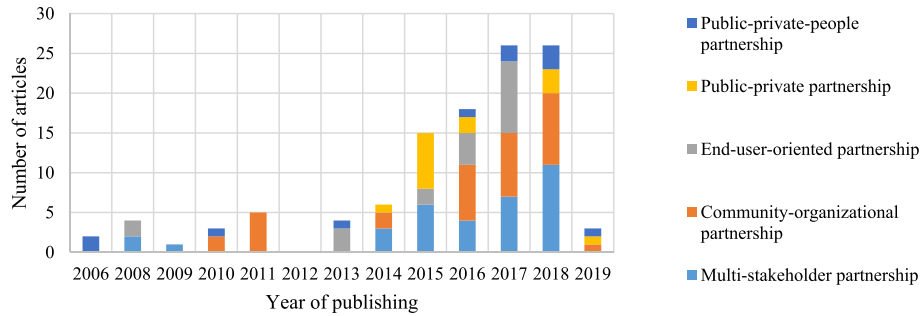


Fig. 2. Publishing year of identified articles.

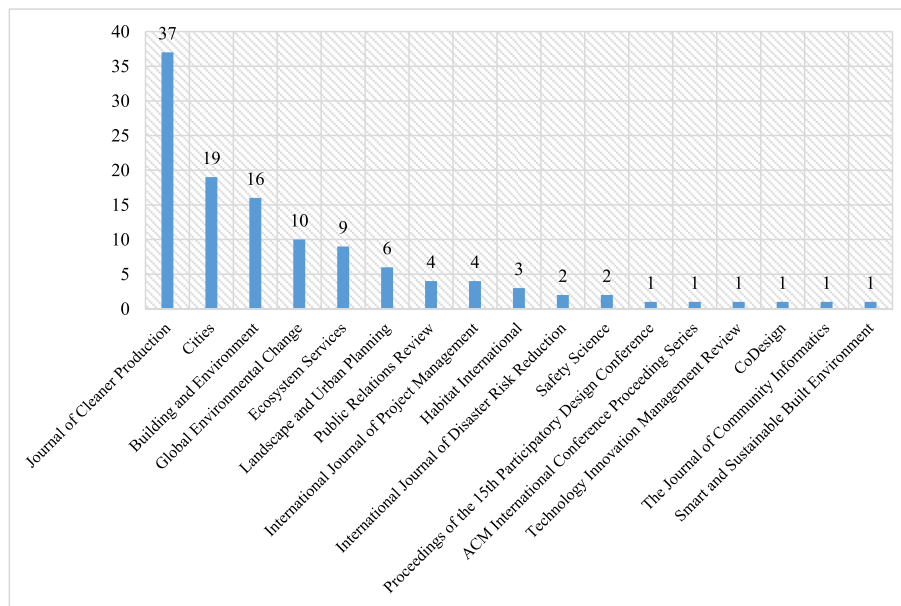


Fig. 3. Publishing journals of sample papers.

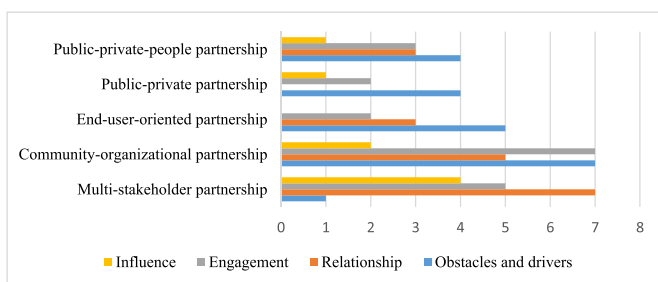


Fig. 4. Research focus of articles in each mode.

environmental institutions, local communities, the media, and others. The research focuses on the papers on multi-stakeholder partnerships are shown in Table 4.

In the literature sample, 35% of the articles focus on the theoretical framework, intending to develop new conceptual methods of participation in urban development (Bissonnette et al., 2018; Fernandez-Anez et al., 2018; Aoki, 2018). Twenty-five percent of the papers use real case studies, relevant for their respective countries and regions (Jung et al., 2015; Cousins, 2017; Aoki, 2018). Forty percent focus on the application of new methods of stakeholders' participation to urban ecosystem projects, such as the Delphi

technique, Q-methodology, network approach and statistical analysis (Yang and Zou, 2014; Alberg Mosgaard et al., 2016; Cousins, 2017; Li and Ng, 2018).

The *relationship* category represents the largest group with 12 papers (35.3%). Specifically, the papers explore the relationship between different stakeholders (de Chazal et al., 2008; Jung et al., 2015; Le Feuvre et al., 2016; Hein et al., 2017; Yang and Bentley, 2017) and the relationship between organizers and stakeholders (Fernandez-Anez et al., 2018). In this part, the problem of balancing the stakeholders' power and involvement received much attention in eight articles, through applying innovative models to real projects. Specifically, Yang and Bentley (2017) proposed a theoretical model for moving away from a sender-centered pattern through power, legitimacy and urgency aspects, to better balance the relationship. Furthermore, an integrated model combining politics, knowledge, economy and social aspects with a set of internal and external factors were proposed by Fernandez-Anez and Fernández-Güell. At the same time, Hein (2017) attempted to balance the relationship between different stakeholders by analyzing the flow of power and value between them. The remaining four articles discuss the impact of behavior and interactions on the relationship of different stakeholders. For example, Le Feuvre et al. (2016) proposed that the stakeholders' cooperation will be affected by the attitude and behavior of different participants.

Ten papers focus on the *engagement* aspect (29.4%) and are

Table 3
The basic characteristics of the five modes of multi-sector partnerships.

Modes	Concepts	Reference/year	Participants in urban context	Impact on urban sustainable development
Multi-stakeholder partnerships	Cooperation between any group or individual who can affect, or is affected by, the achievement of the organization's objectives	Freeman et al. (1984)	Financial institutions, municipalities, management companies, customers, employees, suppliers, local communities, the media, and others	Potential to create financial, environmental, and social sustainable development depending on the project focus, through receiving multiple resources and reducing uncertainty and administrative overhead among stakeholders
Community-organizational partnerships	A group of people, whether they are stakeholders, an interest group, or a group of citizens in the same geographic location	Silberberg et al. (2011)	Stakeholders, interest groups, or groups of citizens in the same geographic location, with similar interests or within a small club	Creates mainly social sustainable development through balancing community interests and creating shared value
End-user-oriented partnerships	The person that receives and ultimately uses the good, service, or technology	U.S. Code § 8541 - Definitions (2019)	Occupants, visitors, owners, and tenants	Suitable for creating financial sustainable development through getting a good understanding of the consumers' desires and values
Public-private partnerships	Formal cooperation between enterprises and local government officials to improve the city	Davis (2016)	Government agencies and private-sector companies	Mainly creates financial and environment sustainable development through combining the political and financial resources from the public sector with the experience and expertise of the private sector
Public-private-people partnerships	A direct extension of public-private partnerships, it adds the "people" to supplement the missing links in the PPP process	Ahmed and Ali (2006)	Government agencies, private-sector companies, and citizens	It can create financial, social, and environment sustainable development through involving all resources from public, private, and people, as well as satisfying their needs

mainly concerned with methods of recruitment (Tyl et al., 2015; Alberg Mosgaard et al., 2016; Cousins, 2017; Aoki, 2018). Several papers underline that the methods of engagement should be chosen according to the participants' values. Specifically, Tyl et al. (2015) highlight different ways of engaging stakeholders by analyzing their values. Based on this, the drivers for participating in a cooperation process have been explored by Ferguson et al. (2017) through statistical analysis. From this, he suggests suitable recruitment methods based on the partners' values, which can be used as guidance in real projects. The way stakeholders form preferences and perspectives is the focus of the article by Cousins (2017), who explained how the circumstances, feelings, and awareness can affect the performance of the Q-methodology. Recently, a theoretical framework for tailoring methods of recruitment to the different types of participants has been provided (Aoki, 2018). Two articles explore dynamic involvement in the participation process. Alberg Mosgaard et al. (2016) analyzed how the participants' education, overall ability, and interest in urban development were linked to their level of engagement in a building renovation process.

The *influence* category also includes 10 papers. Betts et al. (2015) used quantitative confirmatory factor analysis to demonstrate that multi-stakeholder partnerships can improve the environment. Stakeholders' influence is also quantitatively analyzed by Li et al. (2018) in the context of the architectural, engineering and construction industry. The results show that there was more social acceptance of the building public space when created by multiple partners. In addition, three other evaluation methods are used in separate articles. Thabrew et al. (2009) recommended applying the life cycle assessment to guide the decision in urban planning. de Chazal et al. (2008) discussed how different values affect the results with respect to financial and environmental aspects through a

matrix approach. Finally, Li and Ng (2018) studied the influence of various stakeholder groups, using the Delphi approach to quantify the impact of sustainability. The results show that multi-stakeholder partnerships can promote a more sustainable urban development from a social, economic, or environmental aspect, but the emphasis is different in different cases.

Only two papers (5.8%) discuss the *barriers and drivers*. Bissonnette et al. (2018) suggest that prioritizing engagement can improve the efficiency of cooperation at an early stage. In addition, limited standards in the participation process make it difficult for stakeholders with less power to impact the decision-making process (Gan et al., 2018).

With respect to methodology, the most commonly used methods in existing studies are literature reviews, case studies, and statistical analyses. Recent multi-stakeholder articles use novel approaches such as the Delphi technique, Q-methodology, and network approach. The Delphi technique is a statistical method for quantifying subjective evaluation. A large number of people score their personal subjective preferences, and the average value is used as the result (Hallowell, 2009; Chim-Miki and Batista-Canino, 2018). Q-methodology explores the viewpoints of people with different opinions. The result of the method is a sum of these opinions aggregated in a structured way (Buchel and Frantzeskaki, 2015). The last method is the stakeholder network approach, which is grounded in social exchange and resource dependence theory. It emphasizes the dynamic interaction among multiple stakeholders instead of the relationship between only two stakeholders (Sciarelli and Tani, 2013).

3.2.2. Community-organizational partnerships (n = 34)

Community-organizational partnerships is another mode of multi-sector partnerships. This mode is used by one or more

Table 4
Research focuses on multi-stakeholder partnerships.

Research focus	Some criteria/keywords	Main Methods	Main references	Weight (%)
Barriers and drivers	Obstacles, barriers, baffle, encumbrance, traverse	Data collection and analysis; focus groups	Bissonnette et al. (2018); Gan et al. (2018)	5.8%
Relationship	Relationship, relation, connection, hypotaxis, affect	Interviews; case studies; network approach; a Delphi approach; semi-structured interviews; matrix approach	Jung et al. (2015); Le Feuvre et al. (2016); Hein et al. (2017); Yang and Bentley (2017); de Chazal et al. (2008); Fernandez-Anez et al. (2018); Yang and Zou (2014)	35.3%
Engagement	Method, way, means of engagement, how to engage	Brainstorming; Q-methodology; interviews, surveys, focus groups; scenario analysis; life cycle assessment approach	Tyl et al. (2015); Alberg Mosgaard et al. (2016); Cousins (2017); Aoki (2018); Ferguson et al. (2017)	29.4%
Influence	Influence, affect, effect, positive influence, value	Literature review; hypotheses; confirmatory factor analysis (SPSS); IBM SPSS statistic; quantitative method	Betts et al. (2015); Li and Ng (2018); Thabrew et al. (2009); de Chazal et al.(2008); Wang et al. (2014)	29.4%

organizations in projects that are closely related to the community. A community commonly refers to a group of people, whether they are stakeholders, an interest group, or a group of citizens. First, the mode involves influential partners in the community. Then, the initial partners mobilize resources, attempt to improve relationships, promote cooperation, and ultimately achieve community engagement (Esmailpoorarabi et al., 2020). Hence, the applicable sectors would commonly include stakeholders, interest groups, or groups of citizens in the same geographic location, with similar interests or within a small club.

The research focus on community-organizational partnerships is shown in Table 5. The number of identified articles is the same as in multi-stakeholder partnerships. Twenty-three percent of the papers focus on the theoretical framework, while the remaining papers explore the development of community-organizational partnerships with real case studies.

The *barriers and drivers* category represents the largest category with 35.3%, while the *engagement* group accounts for 29.4%, followed by research on the *relationship* which represents 23.5%, and finally the *influence* category with 17.6%. The key objective of the research in this cluster is identifying the barriers and drivers and finding efficient methods of engaging the community in an urban ecosystem.

The sample suggests that the main barriers and drivers for community engagement are financial value and trust. Specifically, five articles emphasize the importance of financial value and three papers focus on the trust factor for engagement. Looking at sale & lease-back and contracting models, Fleiß et al. (2017) claim that monetary and not moral value makes the most important impact on citizen participation. Furthermore, Swapan (2016) claimed that awareness and trust are the main factors for engaging, based on a field survey focusing on social, political and psychological factors. Li and de Jong (2017) argued that distrust is the main barrier for community engagement, by examining the actual performance of citizen participation in eco-city development cases. In addition to the financial value and trust, the geographical location and inclusiveness of decision-making were also considered important factors for engagement. For example, Bottini (2018) explored the factors affecting community participation in the built environment through questionnaires and regression analysis and found the geographical location to be the most important factor. Finally, Young and Brans (2017) analyzed a case study of a sustainable energy community and proposed that inclusiveness in decision-making and co-ownership are the most important factors in community engagement.

In the *engagement* category, the main focus is on engagement approaches. Delannon et al. (2016) compared the community

engagement strategies of 17 companies. They argued that information sharing, community consulting, corporate community joint initiatives, and community relations managers' participation are efficient methods of engagement. At the same time, Ranger et al. (2016) attempted to include the community voices through an interpretive-deliberative-democratic approach. The results showed that knowledge sharing, social learning, and deep communication play crucial roles in the recruitment process. Furthermore, Gold et al. (2018) used system dynamics modeling and real-time analysis for developing a model of collective action for community involvement. In addition, Hu (2018) focused on the role of scientists in the community and their degree of involvement in scientific communication.

The *relationship* category consists of the interactions between the organization and the community and the interaction among different participants in the community. In particular, Robinson and Berkes (2011) proposed that multi-level participation is necessary to increase the interaction between the organization and the community, as the different levels have more potential to adapt to the real situation. Furthermore, social factors such as the level of authority, trust, and social support were shown to affect the interaction between participants (Boiral et al., 2019).

The *influence* group mainly focuses on the impact of community-organizational partnerships on urban ecosystem change. For example, Kithiia and Dowling (2010) used interviews, focused group discussions, and a climate report review to show that community-organizational partnerships can lead to reduced CO2 emissions. Similarly, Robinson and Berkes (2011) used a case study to demonstrate how community-organizational partnerships can increase the adaptive capacity of an ecosystem.

For this mode, the most widely used methods are regression analysis models (Bottini, 2018) and business models (Fleiß et al., 2017), combined with case studies and literature reviews. Regression analysis is a way of mathematically determining the importance of each variable. Namely, which factors matter the most, which ones can be ignored, how they interact with each other and their corresponding uncertainty (Iserbyt et al., 2015). The business model typically focuses on the value proposition, activities design, and profits acquisition (Madsen, 2019). The sustainable business model is designing the business model according to the needs of the community, which can attract multiple citizens to participate (Bocken et al., 2019).

3.2.3. End-user-oriented partnerships (n = 20)

The third mode is the end-user-oriented partnerships. It is widely accepted that the main aspects of sustainable urban development, such as built environment, energy, climate, and

Table 5
Research focuses on community-organizational partnerships.

Research focus	Some criteria/keywords	Main Methods	Main references	Weight (%)
Barriers and drivers	Obstacles, barriers, baffle, encumbrance, traverse, longstop, drivers, factors, opportunities	Case study, literature review, regression models, sale & lease-back model, contracting model	Fleiß et al. (2017); León-Fernández et al. (2018); Swapan (2016); Li and de Jong (2017); Young and Brans (2017); Bottini (2018)	35.3%
Relationship	Interplay, interactions, effect on each other	Case study, literature review, scenario methods	Robinson and Berkes (2011); Robinson and Berkes (2011); Boiral et al. (2019)	23.5%
Engagement	Method, way, means for engagement, how to engage	Case study, literature review, interpretive film-based approach, retrospective, and real-time analysis	Delannon et al. (2016); Ranger et al. (2016); Gold et al. (2018); Hu (2018)	29.4%
Influence	Influence, affect, effect, positive influence, value	Interviews, one-on-one discussions with relevant stakeholders, focused group discussions, documentary review	Kithiia and Dowling (2010); Robinson and Berkes (2011)	17.6%

urban green infrastructure, are determined by their end-users (Knoeri et al., 2016; Wood et al., 2016; Baldassarre et al., 2017a). Consequently, there has been much research on the topic in recent years. The Legal Information Institute defines “end-user” as: “the person that receives and ultimately uses the good, service, or technology” (U.S. Code § 8541 - Definitions, 2019). In the urban development context, end-users typically refer to occupants, visitors, owners and tenant organizations.

Twenty articles were identified and classified according to the research focus given in Table 6. Eight papers focus on the theoretical framework, with literature review as the main method, while the remaining twelve papers conduct case studies to answer their questions. The table shows that the *barriers and drivers* category represents 45% of the papers, followed by the *relationship* and *engagement* groups which account for 30% and 20%, respectively. Only 5% of articles discuss the influence of end-user-oriented partnerships.

In the *barriers and drivers* category, financial means, knowledge sharing, and technologies used for communication represent the main factors for end-user-oriented partnerships. Specifically, Beal et al. (2013) performed a series of tests and claimed that a range of variables can affect the participation of end-users, including age, income, and education. Based on this, Knoeri et al. (2016) proposed that the key drivers are financial benefits, business structure, and communication technology through analyzing the performance of participants. Furthermore, Nielsen et al. (2016) defined the concept of sustainable end-user innovation (SEI), whereby innovation is mainly end-user driven. They further proposed a set of policies to accommodate better SEI, emphasizing that creating platforms for knowledge sharing is an important factor. In a separate paper, Bigerna et al. (2017) suggested technologies play an important role in the end-users' participation through a meta-analysis.

The *relationship* category mainly focuses on the relationship between end-users and developers, as well as the relationship between end-users and practitioners. The relationship between the developers and end-users is studied by Qian et al. (2015), who used a tree game to express how the dynamic relationship developed in different scenarios. Heiskanen et al. (2013) claimed that there is a shortage of approaches for formal and informal interaction between end-users and practitioners.

The *engagement* category mainly explores strategies for joining different types of end-users. For example, Baldassarre et al. (2017a) developed a framework for collecting information for making a value proposition, which is related to business models. Furthermore, the method of door-to-door interviews was tested for promoting end-users participation in three scenarios by Atlason et al. (2017).

One article discusses the *influence* of end-user-oriented partnerships. In a case study of three European firms, Zimmerling et al.

(2017) claimed that constant end-user integration helps companies overcome risks, and brings new opportunities to the market.

In this part, the most commonly used methods are meta-analysis, business model and tree game model. A meta-analysis is a survey in which the results of past studies are combined and analyzed as if they were one study. A business model describes the whole process of conducting business, which mainly contains a value proposition, value transfer, and value acquisition (Geissdoerfer et al., 2017). Business models are applied in this part due to the end-user value being a crucial factor for participation. The tree game model visualizes the decisions and expresses each decision point and decision outcome (Huang et al., 2018).

3.2.4. Public-private partnerships ($n = 14$)

The fourth mode is the public-private partnerships (PPP), which was defined as “formal cooperation between enterprises, social leaders and local government officials to improve the city” by Perry Davis in 1986 (Davis, 2016). Most often, the main applicable sectors are government agencies and private-sector companies. The private partners mainly participate in financing, planning, and managing the projects, while the public partners commonly focus on launching and monitoring the projects.

Among the identified modes of multi-sector partnerships, PPP is the only one not directly involving citizens. However, according to Arnstein (1969), including the citizens in decision-making is crucial for attaining sustainable social development. Hence, only 14 articles concerning PPP projects were chosen. Table 7 shows the research focus on public-private partnerships.

PPP papers are classified slightly differently than the other multi-sector partnerships modes: It is relatively mature, and engagement and barriers are no longer considered main issues. This is very different from the other modes, where citizen engagement is one of the main challenges. Instead, there is much more focus on the application of PPP and its risks.

Eight papers discuss the *application* of PPP, mainly focusing on governmental institutions and policies. For example, Chou et al. (2015) developed sustainable PPP policy guidelines through a strategic governance model, which is designed for increasing adaptability in the event of a global financial crisis. At the same time, Zhang et al. (2015) verified the institutional analysis and its implications in a Chinese context, and argue that good policies can lead to healthy PPP promotion. In addition, the negotiation between the public and private sectors has also received much attention (Almarri and Blackwell, 2014; Liang et al., 2019). Liang et al. (2019) proposed building a game model based on the initial negotiation process, which can be used to guide the renegotiation process.

Four of the papers focus on the risks related to PPP. Projects using PPP generally require a high up-front investment, which

Table 6
Research focuses on end-user-oriented partnerships.

Research focus	Some criteria/keywords	Main Methods	Main references	Weight (%)
Barriers and drivers	Obstacles, barriers, baffle, encumbrance, traverse, drivers, factors, opportunities	Meta-analysis, literature review, snowball sampling, descriptive analysis	Beal et al. (2013); Knoeri et al. (2016); Nielsen et al. (2016); Bigerna et al. (2017)	45%
Relationship Engagement	Interplay, interactions, effect on each other Method, way, means for engagement, how to engage	Game mode, case study Design methodology, quantitative kano analysis, End-of-Life scenarios	Qian et al. (2015); Heiskanen et al. (2013) Baldassarre et al. (2017a); Atlason et al. (2017)	30% 20%
Influence	Influence, affect, effect, value	Case study	Zimmerling et al. (2017)	5%

makes risk assessment very important. Risk realization and risk evaluation in the process of cooperation between public and private were examined by Keers and van Fenema (2018) through cross-case analysis, qualitative studies and a multi-layered approach. The results show that investing in the cooperation structure before formal partnerships can reduce the risks. Furthermore, De Schepper et al. (2015) claimed that efficient risk management, improved methodology, and knowledge management should be the aim of further studies after conducting a literature review of PPP.

Two of the papers pay attention to the barriers and drivers of PPP. The factors with higher impact were considered to be benefits and risks sharing, institutional support, community support, stable economic environment, and information sharing (Osei-Kyei and Chan, 2015; Liu et al., 2016).

Literature reviews, case studies, the multi-layered approach, and statistical methods are the main methods used. The multi-layered method contains multiple levels, with each level including different indicators, and the combination of different levels forming a complex relationship (Li et al., 2018). The statistical approach is based on a large amount of data and analyzes the relationship between different types of data, as well as pointing out further trends.

3.2.5. Public-private-people partnerships ($n = 11$)

The last mode of multi-sector partnerships is public-private-people partnerships (PPPP). A direct extension of PPP, it adds the "people" to supplement the missing links in the PPP process (Ahmed and Ali, 2006). In this model, "public" means government departments, "private" refers to private for-profit enterprises, while "people" represent citizens. The participation of the people makes the existing cooperation more diverse and realistic, thus considering the social aspect, which brings it closer to the complexity of real urban ecosystems (Nunbogu et al., 2018). In the process of participation, the roles of the public, private, and people are usually facilitators, providers, and end-users, respectively. Different participating entities provide assets or services according to their own characteristics.

After extensive searching, eleven related articles were identified and classified by research focus, given in Table 8. Results show that the barriers and drivers and engagement groups together account for

63%. Hence, the key objective of the research is to explore more efficient methods for improving the application of PPPP. The main methods used in this part are literature reviews, semi-structured questionnaires, and case studies.

36% of the articles focus on the barriers and drivers for PPPP. Marana et al. (2018) developed a framework exploring the successful characteristics of PPPP in the resilience-building process. Good relationships among partners, unobstructed information flow, and efficient methods for solving conflicts were considered as main drivers for PPPP. Conversely, the obstacles identified by Ahmed and Ali (2006) are the costs of facilitation, urban services, and feedback mechanisms by case studies. Lodato and DiSalvo (2018) argue that institutions can produce constraints and barriers for the application of PPPP. Shortly after, Foth and Turner (2019) proposed a conceptual framework aiming to transfer the policy-oriented institutions to more community active institutions.

The engagement is another important aspect of PPPP that concerns ways of building an optimal process, involving all the partners at different stages. Ng et al. (2013) visualized the participation process to understand the conflict points and the different needs of the partners. Hughes et al. (2018) try to foster digital participation and informal learning among public, private, and people through social living labs. The main participatory methods included sharing information and experience, co-creation, and co-evaluation around different social concerns. Baccarne et al. (2016) applied a quintuple helix model to explore the innovative methods for applying PPPP through urban living labs, which have been considered a method to work with ad hoc collectives, lowering the barriers for collaboration.

A study on relationship structures of PPPP was conducted by Fontainha et al. (2017) using multiple research methods, such as literature review, data collection, and data interpretation. A visual representation of relationship structures was presented through vertical/horizontal and centralized/decentralized aspects. Foth and Adkinsor (2005) developed and tested a new ethnography research method for understanding the value of citizens engaging in social networks. Based on this, Foth (2017) analyzed the maturity of the relationship between citizens and governments through a critical review approach. The results were categorized into four classes, namely, people as residents, consumers, participants, and co-creators.

Table 7
Research focuses on public-private partnerships.

Research focus	Some criteria/keywords	Main Methods	Main references	Weight (%)
Application	Institution, policy, incentives	Literature review, cross-case analysis, qualitative studies, multi-layered approach	Chou et al. (2015); Zhang et al. (2015); Liang et al. (2019); Almarri and Blackwell (2014)	57.1%
Barriers and drivers	Application, adoption, appliance	Systematic literature reviews, questionnaires, surveys	Osei-Kyei and Chan (2015); T. Liu et al. (2016).	14.3%
Risks	Risks, hazard	Statistical analysis	Keers and van Fenema (2018); De Schepperv et al. (2015)	28.6%

Kuronen et al. (2010) examined the influence of PPPP by investigating the possibility of applying PPPP. In a case study, the application of PPPP was shown to be able to reduce CO2 emissions by 75% through new system design and newly proposed solution by applying knowledge from three sectors.

4. Discussion

This section discusses the results of this study following the three research questions proposed in the introduction.

4.1. What is the current status of multi-sector partnerships research in urban development?

Five modes of multi-sector partnerships were identified. The current status of each mode is different. The multi-stakeholder partnerships category has the largest proportion of the selected papers and employs a more diverse set of methods than the other categories, such as the Delphi technique, Q-methodology, network approach, and regression analysis model. One possible reason for its success is that stakeholders are more willing to participate than other participants since they are often directly affected financially by the outcome of the project. Furthermore, there are more opportunities to conduct practical case studies. Finally, cooperation and balancing of power are somewhat easier than for example PPPP, as everyone has a voice in the decision-making process.

Although community-organizational partnerships is a new concept in the urban development area, the results show that there is much ongoing research. However, the fact that the research mainly focuses on barriers and drivers of engagement indicates that the current level of community participation is not high enough or has not yet achieved effective participation and desired goals.

End-user partnerships group in urban development has begun to receive attention in recent years, however, it is still in its early stages. Research is largely problem-oriented, focusing on identifying barriers for engaging the participants.

Public-private partnerships category is developing well and has a wide range of applications internationally. Different areas such as risk management, relationship management, financial viabilities, and procurement have been explored by researchers worldwide since the late 1990s. In the total sample, only 12.5% of the articles are about PPP projects, however, this is not due to limited research, but to the fact that this paper pays more attention to the common citizens' participation.

The last form of multi-sector partnerships is public-private-people partnerships (PPPP). Eleven related articles were found in all the domains in the database. This is not surprising since it is quite difficult to include people in the PPP models. Government departments can provide corresponding institutional guarantees and enforcement rights, and the private companies can provide investment capital and operational management experience, but

citizens have neither the authority nor the money, making it difficult for them to have an equal position. Moreover, ordinary citizens rarely have enough knowledge to participate in the discussions, and often fail to provide effective strategies. It seems that both the theory and the application of this mode are underdeveloped.

4.2. What are the differences between the various modes of partnerships?

Although all the modes are forms of multi-sector partnerships, there are differences in several aspects. First, the applicable sectors vary. The multi-stakeholder partnerships category is arguably the most general mode. Unlike the other modes, it does not require participants to have a specific background such as public and private sectors but includes any participants who can affect or be affected by the achievement of objectives in the project. Projects based on multi-stakeholder partnerships generally aim to benefit the stakeholders themselves. On the other hand, community-organizational partnerships and PPPP are often formed to create value for mainly the citizens. The applicable sectors for community-organizational partnerships commonly include organizations, stakeholder communities, interest groups, or citizen groups in the same geographic location. For PPPP, the applicable sectors are more focused on the resources and differences between the public and private sectors, as well as the opinions of the citizens. End-user-oriented partnerships also emphasize the opinions of citizens; however, the goal is commonly to make them prosumers. The applicable sectors are the organizers and the people that ultimately use the good, service, or technology. In the public-private partnerships (PPP) model, the main applicable sectors are government agencies and private-sector companies. Unlike the other partnership modes, it does not include the citizens, which sometimes leads to missing the actual need of the citizens.

Second, the level of maturity among the modes is different, which in turn leads to a different research focus. The main research focus for multi-stakeholder partnerships is the relationship between stakeholders, representing 41.2% of the studies in this category. Among these, the majority focuses on how to balance the power of the different stakeholders. This is a sign of maturity, as it has moved beyond problems surrounding barriers and engagement. The research on community-organizational partnerships focuses on mainly the barriers and drivers of community engagement, closely followed by engagement approaches. Furthermore, the results show that financial value and trust are the main factors affecting community engagement. Most papers explore the characteristics of community engagement with case-studies from different regions, due to the cultures in communities being highly dependent on the location. For end-user-oriented partnerships, most papers try to identify factors that affect end-user participation. The results show that financial compensation, knowledge exchange, and technologies used for communicating are the most

Table 8
Research focuses on Public-Private-People partnership.

Research focus	Some criteria/keywords	Main Methods	References	Weight (%)
Barriers and drivers	Obstacles, barriers, baffle, encumbrance, traverse, longstop, drivers, factors, opportunities	Literature review, semi-structured questionnaires, observation	Marana et al. (2018); Ahmed and Ali (2006); Lodato and DiSalvo (2018); Foth and Turner (2019)	36%
Engagement	Method, way, means for engagement, how to engage	Literature review, case study	Ng et al. (2013); Baccarne et al. (2016); Huybrechts et al. (2017)	27%
Relationship	Interplay, interactions, effect on each other	Data analysis and synthesis	Fontainha (2017); Foth and Adkinsor (2005); Foth (2017)	27%
Influence	Influence, affect, effect, positive influence, value	Literature review, case study	Kuronen et al. (2010)	9%

important factors in the participation process, with formal and informal information exchange being crucial as well. For the PPP mode, most of the research is centered on policymaking, rather than problems surrounding engagement. Therefore, at present, the projects in the relevant fields are mostly policy-oriented and the related research mostly discusses how to avoid risks and create benefits. PPPP is the least developed; since the term was introduced in 2006, only eleven research papers have been written on the topic. Existing papers mainly focus on developing theoretical frameworks. There are some theoretical participation strategies, but since there are few corresponding cases, their effectiveness cannot be fully proven.

Third, the modes are suitable for different situations. For projects with a clear objective and where the participants have already been determined, multi-stakeholder partnerships are effective. If the project puts more emphasis on the opinion of the community and a willing suitable organization can be found, the community-organizational partnerships will be a good choice. For projects that aim to create new products or services, the end-user-oriented partnerships should be considered. Projects organized by the public sector can use PPP or PPPP to increase its total resources and reduce risk.

Finally, each method has clear advantages and disadvantages. The biggest advantage of stakeholder partnerships is its maturity and efficiency. However, in an urban sustainable development perspective, there is little emphasis on social sustainability. Community-organizational partnership's main advantage is that a neighborhood community usually shares the same geographical location, which means that they likely have a shared culture and set of values. This facilitates the balancing of their interests and the creation of shared value. Second, the proximity between participants within the community makes it easier to arrange meetings and workshops. However, the engagement process has a lot of barriers, due to a lack of willingness to participate among citizens. End-user-oriented partnerships typically get a good understanding of the consumers' desires and value, however, similarly to community-organizational partnerships, engaging citizens is a big challenge. The PPP has the potential for social welfare and economic benefits, however, by excluding the citizens from the decision-making process, they may not capture the real needs of the citizens. The PPPP has the potential to solve all the previous problems, however, no good method exists.

4.3. What are the most promising areas of improvements for the existing modes?

All five modes of multi-sector partnerships share some common problems related to partner relationship, engagement, barriers and drivers, and influence. Identification of barriers and driving factors can provide a better direction for the engagement strategy. The relationships between different stakeholders play an important role in the final decision-making process. The efficiency of the engagement strategy can lead to the successful application of the modes, and the influence and effects of the methods can help to determine which modes to choose in projects.

First, the relationship between participants is a general issue, as various sectors generally have different power in the decision-making process, which can lead to disagreement and discontent among the participants. Particularly, the power of citizens tends to be quite low in PPPP and end-user-oriented partnerships, which in turn leads to low levels of engagement. However, thus far there are no methods in existing research to efficiently balance their power. Although some studies are starting to explore the appropriate sequencing and combining of participation by the various sectors, which are designed to balance the power among them, the results

are not very clear. There are also papers which suggest that close relationships are efficient for making agreements, but do not mention how to build them. Furthermore, researchers are exploring the relationships between different sectors, but the micro-level classification is missing, such as relationships concerning economic rights and resource sharing. To increase the citizens' participation, as well as improving their role in decision-making, it is clear that further research is needed on managing relationships in multi-sector partnerships.

Second, an efficient approach to engage different sectors is a premise to form multi-sector partnerships. Some researchers discuss various modes of recruitment, from coercive to voluntary ones, and the respective types of participants. However, they do not mention how to combine modes of recruitment with specific sectors, which needs to be further explored. In addition, an approach to make an agreement between participants is key in the engagement process of multi-sector partnerships, as different sectors regularly have different opinions and priorities. Some methods, for example, the Delphi technique, can be used to obtain the collective opinion of the participants in a well-structured and academically rigorous process. However, the path to reach this agreement is quite a time and energy-consuming. For further study, more efficient methods to reach an agreement are needed.

Third, for determining barriers and drivers, the Q-methodology is used to reveal different social perspectives, attitudes, and understandings during the participation process. It is an efficient way to find the factors which affect the willingness of participants. However, investigation reveals that there is no effective way to systematically classify these factors, as well as determine their relative importance.

Finally, with regard to the influence of multi-sector partnerships, the results show that multi-sector partnerships can promote sustainable urban development from social, economic, and environmental aspects. However, most studies only measure the effect at the end of the process, without addressing the influence of the participants in the different stages. Further research in this area may improve understanding of the strengths and weaknesses at each stage of the process.

In addition, there are some specific problems in each mode. For the multi-stakeholder partnerships, its methods are relatively mature and efficient, and in theory, everyone who can affect or have been affected by the objectives of the project are included. However, in real cases, the stakeholders usually do not include all affected parties, especially the citizens, which leads to less value gained in terms of social sustainability. The issue of citizens' engagement should be emphasized in future research.

For community-organizational partnerships, the main issue is engagement. As financial value and trust are considered the most important factors, research on business models could potentially solve the problem. As for trust, more efficient approaches are needed for improving trust between partners. While several theoretical frameworks for engagement strategies exist, they still need to be put into practice to determine their efficiency.

For the end-user-oriented partnerships, the most important factors for participation are financial value, knowledge exchange and use of technology for communication. The development of business models that bring more immediate value to the end-user, as well as digital tools that common citizens can adopt are two possible solutions. Moreover, the interaction between end-users and organizers needs both formal and informal methods, which means that both formal documents and informal communication should be designed.

The PPP has developed well in terms of the application and providing risk guarantees. However, as it does not consider the real needs of citizens, its direct top-down approach may not have the

competitive strength for the increasingly complex urban development. Involving the citizens to share benefits and risks will need further study, in order to achieve higher social acceptance.

PPPP is a good concept that can get support through policies made by the public sector, financial and operational support from the private sector, and an accurate portrayal of the needs of citizens. However, it is still underdeveloped. For further development of this mode, the barriers should first be identified, an efficient engagement method is needed, and a cooperation model should be designed.

5. Conclusion

To cope with the complex challenges and respond to the uncertainty of urban development, multi-sector partnerships, which can facilitate cooperation and combine resources from different fields, are regarded as an efficient approach. The paper conducted a scoping review on multi-sector partnerships in the urban development area, to answer the following research questions:

1. What is the current status of multi-sector partnerships research in the urban development context?
2. What are the differences between the various modes of partnerships?
3. What are the most promising areas for improvement in the existing modes?

Three steps were conducted to determine the sample papers: structured searching, expanded keywords and snowballing search, and filtering selection. Finally, 113 papers were selected, which were used for analyzing the research questions.

The results show that multi-sector partnerships can be classified into five modes, namely multi-stakeholder partnerships, community-organizational partnerships, end-user-oriented partnerships, public-private partnerships, and public-private-people partnerships. According to existing research, multi-stakeholder partnerships established itself early and has developed to a relatively mature level with many types of innovative approaches. Community-organizational partnerships is a newer concept in the urban development area, but there is much ongoing research in the field. End-user partnerships in urban development has begun to receive attention in recent years, however, it is still in its early stages. Public-private partnerships is developing well and has a wide range of applications internationally. Public-private-people partnerships is underdeveloped in both theory and application.

Although the five modes of multi-sector partnerships all focus on the success of multiple participation for sustainable urban development, several aspects differ. First, the applicable sectors vary according to the partners in each method. Second, the level of maturity among the modes is different, which in turn leads to a different research focus. Third, the modes are suitable for different situations. Finally, each method has clear advantages and disadvantages. A more detailed description is given in the discussion section.

Areas for improvement have also been identified for each of the modes. Research shows that multi-stakeholder partnerships rarely include citizens, which can lead to reduced end-user value and fewer benefits in terms of social sustainability. This can be improved by emphasizing the citizens' role in multi-stakeholder partnerships in future research. The main issue in community-organizational partnerships is engagement, for which the most important factors are financial value and trust. Research on new business models can improve the financial value aspect, whereas more efficient methods are needed for establishing trust. End-user-oriented partnerships also struggle with the engagement of

citizens, with the main factors being financial value, exchange of knowledge and choice of technology for communication. The development of better methods of communication, both formal and informal, are needed. Public-private partnerships' top-down approach sometimes makes it difficult to capture the real needs of citizens. A possible solution is including citizens in the decision-making process, i.e. public-private-people partnerships. However, PPPP is currently underdeveloped in both theory and application; its barriers need to be fully identified, and an efficient engagement approach is needed, and a cooperation model should be designed.

Finally, there are some limitations to this research. First, the scoping approach is less rigorous than a systematic review, as its main purpose is to identify the research gaps. Second, it only identifies articles written after the year 2000, as its purpose is to find the latest research questions, but the content of the selected materials could be incomplete. Third, only articles written in English from acknowledged journals were included.

In summary, three main contributions were made for the multi-sector partnerships for sustainable urban development. First, this paper identified and compared five modes of multi-sector partnerships, which is the first time in an urban development context. Second, the paper explained the history, current state, and limitations of these modes. Third and most importantly, it determined gaps in the research of each mode, which can direct further study in this area.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Ahmed, S.A., Ali, S.M., 2006. 'People as partners: facilitating people's participation in public-private partnerships for solid waste management'. *Habitat International*. Pergamon 30 (4), 781–796. <https://doi.org/10.1016/j.HABITATINT.2005.09.004>.
- Alberg Mosgaard, M., Kerndrup, S., Riisgaard, H., 2016a. Stakeholder constellations in energy renovation of a Danish Hotel. *Journal of Cleaner Production*. Elsevier Ltd 135, 836–846. <https://doi.org/10.1016/j.jclepro.2016.06.180>.
- Alberg Mosgaard, M., Kerndrup, S., Riisgaard, H., 2016b. Stakeholder constellations in energy renovation of a Danish Hotel. *Journal of Cleaner Production*. Elsevier 135, 836–846. <https://doi.org/10.1016/j.jclepro.2016.06.180>.
- Almarri, K., Blackwell, P., 2014. Improving risk sharing and investment appraisal for PPP procurement success in large green projects. *Procedia - Social and Behavioral Sciences*. Elsevier BV 119, 847–856. <https://doi.org/10.1016/j.sbspro.2014.03.095>.
- Amadi, B.O., Abdullah, H., 2011. Evaluating multi-sector partnerships for sustainable community development in Nigeria. *Can. Soc. Sci.* 7 (6), 1–8. <https://doi.org/10.3968/j.css.1923669720110706.053>.
- Aoki, N., 2018. Sequencing and combining participation in urban planning: the case of tsunami-ravaged Onagawa Town, Japan. *Cities*. Pergamon 72, 226–236. <https://doi.org/10.1016/j.cities.2017.08.020>.
- Arnstein, S.R., 1969. A ladder of citizen participation. *J. Am. Plann. Assoc.* 35 (4), 216–224. <https://doi.org/10.1080/01944366908977225>.
- Atlason, R.S., Giacalone, D., Parajuly, K., 2017. 'Product design in the circular economy: users' perception of end-of-life scenarios for electrical and electronic appliances'. *J. Clean. Prod.* 168, 1059–1069. <https://doi.org/10.1016/j.jclepro.2017.09.082>. Elsevier.
- Baccarne, B., et al., 2016. Governing quintuple helix innovation: urban living labs and socio-ecological entrepreneurship. *Technology Innovation Management Review* 6 (3), 22–30. Available at: <http://timreview.ca/article/972http://timreview.ca/article/972>. Accessed: 5 February 2020.
- Baldassarre, B., et al., 2017. Bridging sustainable business model innovation and user-driven innovation: a process for sustainable value proposition design. *J. Clean. Prod.* 147, 175–186. <https://doi.org/10.1016/j.jclepro.2017.01.081>.
- Beal, C.D., Stewart, R.A., Fielding, K., 2013. A novel mixed method smart metering

- approach to reconciling differences between perceived and actual residential end use water consumption. *J. Clean. Prod.* 60, 116–128. <https://doi.org/10.1016/j.jclepro.2011.09.007>. Elsevier.
- Le Ber, M.J., Ivey, R., Branzei, O., 2010. (Re)Forming strategic cross-sector partnerships relational processes of social innovation. *Bus. Soc.* 49, 140–172. <https://doi.org/10.1177/0007650309345457>.
- Betts, T.K., Wiengarten, F., Tadisina, S.K., 2015. Exploring the impact of stakeholder pressure on environmental management strategies at the plant level: what does industry have to do with it? *J. Clean. Prod.* 92, 282–294. <https://doi.org/10.1016/j.jclepro.2015.01.002>. Elsevier.
- Bigerna, S., et al., 2017. A new unified approach to evaluate economic acceptance towards main green technologies using the meta-analysis. *J. Clean. Prod.* 167, 1251–1262. <https://doi.org/10.1016/j.jclepro.2017.07.188>. Elsevier.
- Bissonnette, J.-F., et al., 2018. Moving forward in implementing green infrastructures: stakeholder perceptions of opportunities and obstacles in a major North American metropolitan area. *Cities* 81, 61–70. <https://doi.org/10.1016/j.cities.2018.03.014>. Pergamon.
- Bissonnette, J.F., et al., 2018. Moving forward in implementing green infrastructures: stakeholder perceptions of opportunities and obstacles in a major North American metropolitan area. *Cities* 81, 61–70. <https://doi.org/10.1016/j.cities.2018.03.014>. Elsevier Ltd.
- Bocken, N., Boons, F., Baldassarre, B., 2019. Sustainable business model experimentation by understanding ecologies of business models. *J. Clean. Prod.* 208, 1498–1512. <https://doi.org/10.1016/j.jclepro.2018.10.159>. Elsevier.
- Boiral, O., Heras-Saizarbitoria, I., Brotherton, M.C., 2019. Corporate sustainability and indigenous community engagement in the extractive industry. *J. Clean. Prod.* 235, 701–711. <https://doi.org/10.1016/j.jclepro.2019.06.311>. Elsevier Ltd.
- Bottini, L., 2018. The effects of built environment on community participation in urban neighbourhoods: an empirical exploration. *Cities* 81, 108–114. <https://doi.org/10.1016/j.cities.2018.03.020>. Pergamon.
- Bowen, D., et al., 2017. Systematic review of quantitative measures of stakeholder engagement. *Clinical and Translational Science* 10 (5), 314–336. <https://doi.org/10.1111/cts.12474>. Wiley/Blackwell (10.1111).
- Buchel, S., Frantzeskaki, N., 2015. Citizens' voice: a case study about perceived ecosystem services by urban park users in Rotterdam, The Netherlands. *Ecosystem Services* 12, 169–177. <https://doi.org/10.1016/j.ecoser.2014.11.014>. Elsevier.
- Bunn, M.D., Azmi, F., Puentes, M., 2009. Stakeholder perceptions and implications for technology marketing in multi-sector innovations: the case of intelligent transport systems. *Int. J. Technol. Market.* 4 (2/3), 129. <https://doi.org/10.1504/ijtmkt.2009.026866>.
- Carmichael, L., et al., 2019. Urban planning as an enabler of urban health: challenges and good practice in England following the 2012 planning and public health reforms. *Land Use Pol.* 84, 154–162. <https://doi.org/10.1016/j.landusepol.2019.02.043>. Elsevier Ltd.
- Chachoua, E., Whelan, T., 2019. Partnerships for sustainable finance: why multi-stakeholder collaboration is key to delivering a new financial system – global partnership for effective development Co-operation. Available at: <http://effectivecooperation.org/2019/07/partnerships-for-sustainable-finance-why-multi-stakeholder-collaboration-is-key-to-delivering-a-new-financial-system/>. Accessed: 28 April 2020.
- de Chazal, J., et al., 2008. Including multiple differing stakeholder values into vulnerability assessments of socio-ecological systems. *Global Environmental Change*. Pergamon 18 (3), 508–520. <https://doi.org/10.1016/j.gloenvcha.2008.04.005>.
- Chim-Miki, A.F., Batista-Canino, R.M., 2018. Development of a tourism cooperation model: a preliminary Delphi study. *J. Hospit. Tourism Manag.* 37, 78–88. <https://doi.org/10.1016/j.jhtmt.2018.10.004>. Elsevier.
- Chou, J.-S., et al., 2015. Strategic governance for modeling institutional framework of public–private partnerships. *Cities* 42, 204–211. <https://doi.org/10.1016/j.cities.2014.07.003>. Pergamon.
- Clarke, et al., 2019. More-Than-Human Participation: Design for Sustainable Smart City Futures. <https://doi.org/10.1145/3319075> interactions.
- Cousins, J.J., 2017. Infrastructure and institutions: stakeholder perspectives of stormwater governance in Chicago. *Cities* 66, 44–52. <https://doi.org/10.1016/j.cities.2017.03.005>. Pergamon.
- Davis, P., 2016. 'Why Partnerships ? Why Now ? The Academy of Political Science 36 (2), 1–3.
- Delannon, N., Raufflet, E., Baba, S., 2016. Corporate community engagement strategies and organizational arrangements: a multiple case study in Canada. *J. Clean. Prod.* 129, 714–723. <https://doi.org/10.1016/j.jclepro.2016.03.047>. Elsevier.
- Erickson, J., et al., 2017. Progress along the pathway for transforming regional health: a pulse check on multi-sector partnerships. Available at: www.rethinkhealth.org. Accessed: 3 March 2020.
- Esmailpoorabi, N., et al., 2020. How can an enhanced community engagement with innovation districts be established? Evidence from Sydney, Melbourne and Brisbane. *Cities* 96. <https://doi.org/10.1016/j.cities.2019.102430>. Elsevier Ltd.
- Ferguson, L., et al., 2017. Exploring participant motivations and expectations in a researcher-stakeholder engagement process: willamette Water 2100. *Landsc. Urban Plann.* 157, 447–456. <https://doi.org/10.1016/j.landurbplan.2016.08.014>. Elsevier.
- Fernandez-Anez, V., Fernández-Güell, J.M., Giffing, R., 2018. Smart City implementation and discourses: an integrated conceptual model. The case of Vienna. *Cities* 78, 4–16. <https://doi.org/10.1016/j.cities.2017.12.004>. Pergamon.
- Le Feuvre, M., et al., 2016. Understanding stakeholder interactions in urban partnerships. *Cities* 52, 55–65. <https://doi.org/10.1016/j.cities.2015.10.017>. Pergamon.
- Fleiß, E., et al., 2017. Money, not morale: the impact of desires and beliefs on private investment in photovoltaic citizen participation initiatives. *J. Clean. Prod.* 141, 920–927. <https://doi.org/10.1016/j.jclepro.2016.09.123>. Elsevier.
- Fontainha, T.C., et al., 2017. Public-private-people relationship stakeholder model for disaster and humanitarian operations. *International Journal of Disaster Risk Reduction* 22, 371–386. <https://doi.org/10.1016/j.ijdrr.2017.02.004>. Elsevier.
- Foth, M., 2017. Participatory Urban Informatics: towards Citizen-Ability. Smart and Sustainable Built Environment. <https://doi.org/10.1108/SASBE-10-2017-0051>.
- Foth, M., Adkinsor, B., 2005. A research design to build effective partnerships between city planners , developers , government and urban neighbourhood communities. *J. Community Inf.* 116–126.
- Foth, M., Turner, T.J., 2019. The premise of institutioning for the proliferation of communities and technologies research. *ACM International Conference Proceeding Series* 24–28. <https://doi.org/10.1145/3328320.3328398>.
- Freeman, R.E., Harrison, J.S., Wicks, A.C., Parmar, B.L., de Colle, S., 1984. *Stakeholder Theory: The State of the Art*. Cambridge University Press.
- Gan, X., Chang, R., Wen, T., 2018. Overcoming barriers to off-site construction through engaging stakeholders: a two-mode social network analysis. *J. Clean. Prod.* 201, 735–747. <https://doi.org/10.1016/j.jclepro.2018.07.299>. Elsevier Ltd.
- Geissdoerfer, M., Savaget, P., Evans, S., 2017. The cambridge business model innovation process. *Procedia Manufacturing* 8, 262–269. <https://doi.org/10.1016/j.promfg.2017.02.033>. Elsevier.
- Gold, S., Muthuri, J.N., Reiner, G., 2018. 'Collective action for tackling "wicked" social problems: a system dynamics model for corporate community involvement'. *J. Clean. Prod.* 179, 662–673. <https://doi.org/10.1016/j.jclepro.2017.11.197>. Elsevier.
- Hallowell, M.R., 2009. Techniques to minimize bias when using the Delphi method to quantify construction safety and health risks. In: *Construction Research Congress 2009*. American Society of Civil Engineers, Reston, VA, pp. 1489–1498. [https://doi.org/10.1061/41020\(339\)151](https://doi.org/10.1061/41020(339)151).
- Hein, A.M., et al., 2017. Stakeholder power in industrial symbioses: a stakeholder value network approach. *J. Clean. Prod.* 148, 923–933. <https://doi.org/10.1016/j.jclepro.2017.01.136>. Elsevier.
- Heiskanen, E., Johnson, M., Vadovics, E., 2013. Learning about and involving users in energy saving on the local level. *J. Clean. Prod.* 48, 241–249. <https://doi.org/10.1016/j.jclepro.2012.08.019>. Elsevier.
- Hu, S., et al., 2018. Engaging scientists in science communication: the effect of social proof and meaning. *J. Clean. Prod.* 170, 1044–1051. <https://doi.org/10.1016/j.jclepro.2017.09.210>. Elsevier.
- Huang, Z., et al., 2018. A novel optimization model based on game tree for multi-energy conversion systems. *Energy* 150, 109–121. <https://doi.org/10.1016/j.en-erg.2018.02.091>. Pergamon.
- Hughes, H., et al., 2018. Fostering digital participation through social living labs in Townsville: a qualitative case study from regional. *Aust. Now.* <https://doi.org/10.1080/22041451.2017.1287032>.
- Huybrechts, L., Benesch, H., Geib, J., 2017. Institutioning: participatory design, Co-design and the public realm. *CoDesign* 13 (3), 148–159. <https://doi.org/10.1080/15710882.2017.1355006>. Taylor and Francis Ltd.
- Iserbyt, P., Schoupe, G., Charlier, N., 2015. A multiple linear regression analysis of factors affecting the simulated Basic Life Support (BLS) performance with Automated External Defibrillator (AED) in Flemish lifeguards. *Resuscitation* 89, 70–74. <https://doi.org/10.1016/j.resuscitation.2015.01.010>. Elsevier.
- Jung, T.H., et al., 2015. The role of stakeholder collaboration in culture-led urban regeneration: a case study of the Gwangju project, Korea. *Cities* 44, 29–39. <https://doi.org/10.1016/j.cities.2014.12.003>. Pergamon.
- Kahila-Tani, M., Kytta, M., Geertman, S., 2019. Does mapping improve public participation? Exploring the pros and cons of using public participation GIS in urban planning practices. *Landsc. Urban Plann.* 186, 45–55. <https://doi.org/10.1016/j.landurbplan.2019.02.019>. Elsevier B.V.
- Karatas, A., El-Rayes, K., 2015. Evaluating the performance of sustainable development in urban neighborhoods based on the feedback of multiple stakeholders. *Sustainable Cities and Society* 14 (1), 374–382. <https://doi.org/10.1016/j.scs.2014.05.011>. Elsevier Ltd.
- Keers, B.B.M., van Fenema, P.C., 2018. Managing risks in public-private partnership formation projects. *Int. J. Proj. Manag.* 36 (6), 861–875. <https://doi.org/10.1016/j.jprojman.2018.05.001>. Pergamon.
- Kithia, J., Dowling, R., 2010. An integrated city-level planning process to address the impacts of climate change in Kenya: the case of Mombasa. *Cities* 27 (6), 466–475. <https://doi.org/10.1016/j.cities.2010.08.001>. Pergamon.
- Knoeri, C., Steinberger, J.K., Roelich, K., 2016. End-user centred infrastructure operation: towards integrated end-use service delivery. *J. Clean. Prod.* 132, 229–239. <https://doi.org/10.1016/j.jclepro.2015.08.079>. Elsevier.
- Kościelniak, H., Górka, A., 2016. Green cities PPP as a method of financing sustainable urban development. In: *Transportation Research Procedia*. Elsevier B.V., pp. 227–235. <https://doi.org/10.1016/j.trpro.2016.11.022>.
- Kuronen, M., et al., 2010. Public-private-people partnership as a way to reduce carbon dioxide emissions from residential development. In: *International Journal of Strategic Property Management*, vol. 14. Taylor & Francis Group, pp. 200–216. <https://doi.org/10.3846/ijspm.2010.15.3>.
- Legal Information Institute. U.S. Code § 8541 - definitions. Available at: <https://www.law.cornell.edu/uscode/text/22/8541>. Accessed: 19 December 2019.
- León-Fernández, Y., et al., 2018. Enhancing environmental management in

- universities through participation: the case of the University of Córdoba. *J. Clean. Prod.* 172, 4328–4337. <https://doi.org/10.1016/j.jclepro.2017.06.103>. Elsevier.
- Li, H., de Jong, M., 2017. Citizen participation in China's eco-city development. Will "new-type urbanization" generate a breakthrough in realizing it? *J. Clean. Prod.* 162, 1085–1094. <https://doi.org/10.1016/j.jclepro.2017.06.121>. Elsevier.
- Li, H., Ng, S.T., 2018. Quantifying stakeholder influence in decision/evaluations relating to sustainable construction in China – a Delphi approach. *J. Clean. Prod.* 173, 160–170. <https://doi.org/10.1016/j.jclepro.2017.04.151>. Elsevier.
- Li, H., Ng, S.T., Skitmore, M., 2018. Stakeholder impact analysis during post-occupancy evaluation of green buildings – a Chinese context. *Build. Environ.* 128, 89–95. <https://doi.org/10.1016/j.buildenv.2017.11.014>. Pergamon.
- Li, X., Xu, G., Tang, M., 2018. Community detection for multi-layer social network based on local random walk. *J. Vis. Commun. Image Represent.* 57, 91–98. <https://doi.org/10.1016/j.vjcr.2018.10.003>. Academic Press.
- Li, Y., et al., 2019. Enhancing the adaptive capacity for urban sustainability: a bottom-up approach to understanding the urban social system in China. *J. Environ. Manag.* 235, 51–61. <https://doi.org/10.1016/j.jenvman.2019.01.044>. Academic Press.
- Liang, Q., et al., 2019. A game theory approach for the renegotiation of Public-Private Partnership projects in Chinese environmental and urban governance industry. *J. Clean. Prod.* 238. <https://doi.org/10.1016/j.jclepro.2019.117952>. Elsevier Ltd.
- Liu, T., Wang, Y., Wilkinson, S., 2016. 'Identifying critical factors affecting the effectiveness and efficiency of tendering processes in Public-Private Partnerships (PPPs): a comparative analysis of Australia and China'. *Int. J. Proj. Manag.* 34 (4), 701–716. <https://doi.org/10.1016/j.ijproman.2016.01.004>. Pergamon.
- Lodato, T., DiSalvo, C., 2018. Institutional constraints: the forms and limits of participatory design in the public realm. Proceedings of the 15th Participatory Design Conference: Full Papers - 1. <https://doi.org/10.1145/3210586.3210595>, 5: 1–5:12.
- Loh, S., et al., 2020. A more-than-human perspective on understanding the performance of the built environment. *Architect. Sci. Rev.* 1–12. <https://doi.org/10.1080/00038628.2019.1708258>. Informa UK Limited.
- Madsen, H.L., 2019. Business model innovation and the global ecosystem for sustainable development. *J. Clean. Prod.* 119102. <https://doi.org/10.1016/j.jclepro.2019.119102>.
- Marana, P., Labaka, L., Sarriegi, J.M., 2018. A framework for public-private-people partnerships in the city resilience-building process. *Saf. Sci.* 110, 39–50. <https://doi.org/10.1016/j.ssci.2017.12.011>. Elsevier.
- Morsink, K., Hofman, P.S., Lovett, J.C., 2011. Multi-stakeholder partnerships for transfer of environmentally sound technologies. *Energy Pol.* 39 (1), 1–5. <https://doi.org/10.1016/j.enpol.2010.09.043>.
- Nel, D., 2017. Multi-sector stakeholder partnerships as a mechanism for creating public value. *African Journal of Public Affairs* 63–79.
- Ng, S.T., Wong, J.M.W., Wong, K.K.W., 2013. A public private people partnerships (P4) process framework for infrastructure development in Hong Kong. *Cities* 31, 370–381. <https://doi.org/10.1016/j.cities.2012.12.002>. Pergamon.
- Nielsen, K.R., Reisch, L.A., Thøgersen, J., 2016. Sustainable user innovation from a policy perspective: a systematic literature review. *J. Clean. Prod.* 133, 65–77. <https://doi.org/10.1016/j.jclepro.2016.05.092>. Elsevier.
- Nunbogu, A.M., et al., 2018. "Doing it "ourselves": civic initiative and self-governance in spatial planning. *Cities* 74, 32–41. <https://doi.org/10.1016/j.cities.2017.10.022>. Pergamon.
- Okeke, D.C., Ifeoma, U., 2019. Conceptualizing urban space (environment) for the delivery of sustainable urban development in Africa: evidence from Enugu City in Nigeria. *Land Use Pol.* 87. <https://doi.org/10.1016/j.landusepol.2019.104074>. Elsevier Ltd.
- Osei-Kyei, R., Chan, A.P.C., 2015. 'Review of studies on the critical success factors for public-private partnership (PPP) projects from 1990 to 2013'. *Int. J. Proj. Manag.* 33 (6), 1335–1346. <https://doi.org/10.1016/j.ijproman.2015.02.008>. Pergamon.
- Panagopoulos, T., González Duque, J.A., Bostenaru Dan, M., 2016. Urban planning with respect to environmental quality and human well-being. *Environ. Pollut.* 208, 137–144. <https://doi.org/10.1016/j.envpol.2015.07.038>. Elsevier Ltd.
- Pittz, T.G., Adler, T., 2016. An exemplar of open strategy: decision-making within multi-sector collaborations. *Manag. Decis.* 54 (7), 1595–1614. <https://doi.org/10.1108/MD-04-2015-0153>. Emerald Group Publishing Ltd.
- Qian, Q.K., et al., 2015. Modeling the green building (GB) investment decisions of developers and end-users with transaction costs (TCs) considerations. *J. Clean. Prod.* 109, 315–325. <https://doi.org/10.1016/j.jclepro.2015.04.066>. Elsevier.
- Ranger, S., et al., 2016. Forming shared values in conservation management: an interpretive-deliberative-democratic approach to including community voices. *Ecosystem Services* 21, 344–357. <https://doi.org/10.1016/j.ecoser.2016.09.016>. Elsevier.
- Robinson, L.W., Berkes, F., 2011. 'Multi-level participation for building adaptive capacity: formal agency-community interactions in northern Kenya'. *Global Environmental Change*. Pergamon 21 (4), 1185–1194. <https://doi.org/10.1016/j.gloenvcha.2011.07.012>.
- Rowe, J.E., 2018. 'Effective multi-level, multi-sector, school-based obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children'. *Journal of Health Care for the Poor and Underserved*. Project Muse 29 (4), 1606–1607. <https://doi.org/10.1353/hpu.2018.0115>.
- De Schepper, S., Haezendonck, E., Dooms, M., 2015. 'Understanding pre-contractual transaction costs for Public-Private Partnership infrastructure projects'. *Int. J. Proj. Manag.* 33 (4), 932–946. <https://doi.org/10.1016/j.ijproman.2014.10.015>. Pergamon.
- Sciarelli, M., Tani, M., 2013. Business Systems Review Network Approach and Stakeholder Management. <https://doi.org/10.7350/BSR.V09.2013>.
- Silberberg, M., et al., 2011. Principle of Community Engagement.
- Swapan, M.S.H., 2016. Who participates and who doesn't? Adapting community participation model for developing countries. *Cities* 53, 70–77. <https://doi.org/10.1016/j.cities.2016.01.013>. Pergamon.
- Tang, Y., et al., 2018. Study on the impacts of sharing business models on economic performance of distributed PV-Battery systems. *Energy* 161, 544–558. <https://doi.org/10.1016/j.energy.2018.07.096>. Elsevier Ltd.
- Thabrew, L., Wiek, A., Ries, R., 2009. Environmental decision making in multi-stakeholder contexts: applicability of life cycle thinking in development planning and implementation. *J. Clean. Prod.* 17 (1), 67–76. <https://doi.org/10.1016/j.jclepro.2008.03.008>. Elsevier.
- Tyl, B., et al., 2015. The integration of a stakeholder perspective into the front end of eco-innovation: a practical approach. *J. Clean. Prod.* 108, 543–557. <https://doi.org/10.1016/j.jclepro.2015.07.145>. Elsevier.
- Wang, P., et al., 2014. Link prediction in social networks: the state-of-the-art. Available at: <http://arxiv.org/abs/1411.5118>. Accessed: 20 November 2018.
- Warhurst, A., 2014. Corporate citizenship and corporate social investment. *J. Corp. Citizen.* 2001 (1), 57–73. <https://doi.org/10.9774/gleaf.4700.2001.sp.00008>.
- Wood, L.C., et al., 2016. Green hospital design: integrating quality function deployment and end-user demands. *J. Clean. Prod.* 112, 903–913. <https://doi.org/10.1016/j.jclepro.2015.08.101>. Elsevier.
- Wright, R., Stein, M., 2005. 'Snowball Sampling'. *Encyclopedia Of Social Measurement*. Elsevier, pp. 495–500. <https://doi.org/10.1016/B0-12-369398-5/00087-6>.
- Yan, Y., et al., 2018. Urban sustainable development efficiency towards the balance between nature and human well-being: connotation, measurement, and assessment. *J. Clean. Prod.* 178, 67–75. <https://doi.org/10.1016/j.jclepro.2018.01.013>. Elsevier Ltd.
- Yang, A., Bentley, J., 2017. 'A balance theory approach to stakeholder network and apology strategy'. *Public Relations Review*. *J. ASTM Int. (JAI)* 43 (2), 267–277. <https://doi.org/10.1016/j.pubrev.2017.02.012>.
- Yang, R.J., Zou, P.X.W., 2014. Stakeholder-associated risks and their interactions in complex green building projects: a social network model. *Build. Environ.* 73, 208–222. <https://doi.org/10.1016/j.buildenv.2013.12.014>. Pergamon.
- Yigitcanlar, T., Foth, M., Kamruzzaman, M., 2019. Towards post-anthropocentric cities: reconceptualizing smart cities to evade urban ecocide. *J. Urban Technol.* 26 (2), 147–152. <https://doi.org/10.1080/10630732.2018.1524249>. Routledge.
- Young, J., Brans, M., 2017. Analysis of factors affecting a shift in a local energy system towards 100% renewable energy community. *J. Clean. Prod.* 169, 117–124. <https://doi.org/10.1016/j.jclepro.2017.08.023>. Elsevier.
- Zhang, S., et al., 2015. PPP application in infrastructure development in China: institutional analysis and implications. *Int. J. Proj. Manag.* 33 (3), 497–509. <https://doi.org/10.1016/j.ijproman.2014.06.006>. Pergamon.
- Zimmerling, E., Purтик, H., Welpel, I.M., 2017. 'End-users as co-developers for novel green products and services – an exploratory case study analysis of the innovation process in incumbent firms'. *J. Clean. Prod.* 162, S51–S58. <https://doi.org/10.1016/j.jclepro.2016.05.160>. Elsevier.