
Definitions and Redefinitions of Urban Sustainability: A Bibliometric Approach

Qualifier ou requalifier la durabilité urbaine ? Une approche bibliométrique

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Electronic version

URL: <http://journals.openedition.org/eue/1540>

ISSN: 1916-4645

Publisher

Institut national de Recherche scientifique Urbanisation Culture et Société

Electronic reference

Philippe Hamman, « Definitions and Redefinitions of Urban Sustainability: A Bibliometric Approach », *Environnement Urbain / Urban Environment* [Online], Volume 11 | 2017, Online since 04 April 2017, connection on 19 April 2019. URL : <http://journals.openedition.org/eue/1540>

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Definitions and Redefinitions of Urban Sustainability: A Bibliometric Approach

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This paper was translated from French by Jean-Yves Bart and received support from the Excellence Initiative of the University of Strasbourg, funded by the French government's Future Investments program. The author would also like to thank Cécile Frank and Céline Monicolle (Laboratory Societies, Actors and Government in Europe, SAGE, UMR 7363, CNRS-University of Strasbourg) for their help in building the corpus of papers and processing it using IRaMuTeQ.

Introduction

- 1 At the Earth Summit in 1992, “sustainable development” was presented as an alternative approach to doggedly following the imperative of economic growth – one that was vague enough to be appropriated by a wide array of actors with diverging objectives (McManus, 1996). It became a popular concept in the 1990s and 2000s (Hamman, 2009, 2012) and a subject of apparent consensus. But the economic crisis of 2007 revealed its flaws, showcasing the divide between a technical and economic view of sustainability and an ecological and social version (Christen and Hamman, 2015). This paper will investigate evolutions in and alternatives to the sustainability paradigm and examine these new trends. It offers a review of the social science literature that focuses on the discourses of the “sustainable city” and tries to clarify the production of concepts by researchers and experts, based on a corpus of recognized scholarly journals.
- 2 This approach will be conducive to delving into three main issues. First, a great many definitions of sustainable development have been put forward in the past thirty years. They often only partially overlap, emphasizing one aspect or the other. Their number

keeps increasing as interest in the subject extends across disciplines (Aguirre, 2002; Redclift and Springett, 2015). Inventorying these definitions is made all the more difficult by the fact that they vary across countries (not to mention translation issues – for instance between *sustainable* in English and *durable* in French) and that the knowledge and representations of the actors involved keep changing (McManus, 1996).

- 3 Secondly, other concepts have appeared that suggest the possibility of alternatives to sustainable development, such as those of “resilience” and “transition”. They are used by policy-makers, citizens and academics (Lockie *et al.*, 2014; Mathevet and Bousquet, 2014). Considering their status and scope and trying to establish whether they compete with or complement “sustainability” is valuable.
- 4 Lastly, numerous criticisms of the sustainable development paradigm have been voiced. Detractors have pointed out the continuing primacy of economic standards, lingering social injustice, and even the emergence of new environmental inequalities between those who have the necessary resources to benefit from technical innovations and the others. They develop three arguments: (i) watered-down ecological references are used as legitimization tools by public and private decision-makers; (ii) a normative and managerial vision of the common good is increasingly widespread; (iii) the participation of citizens, often highlighted, is actually quite strictly limited (Pearsall *et al.*, 2012; Boissonade, 2015; Christen and Hamman, 2015; Hajek *et al.*, 2015). This may explain why the *International Union for Conservation of Nature (IUCN)* has in the past few years refrained from using the term of “sustainable development”. Its 2008 *Transition to Sustainability: Towards a Humane and Diverse World*¹ uses *sustainability* and *ecological sustainability*, which are meant to be different from *sustainable development*, in that they refer to a state or a condition that implies stability as opposed to a continuing process.
- 5 Based on these three observations, sustainable development can be described as a contingent or transitional concept, whose practical relevance was evidenced in the 1990s and 2000s by its impact on public policy language (Atkinson *et al.*, 2007, Emiliannof and Stegassy, 2010; Hamman, 2009, 2012). The concept gained momentum during years of a globalization whose context has changed since the 2007–2008 crisis.
- 6 Considering the hypothesis that published research and academic controversies are useful indicators not only of an important “research front” but also of the existence of societal debates, this paper examines two broad questions. First, it analyzes the multiple meanings assigned to sustainability. Then, it looks into the possibility of an alternative in an era that has been called “post-political” (Žižek, 2009), where the public debate is sometimes obscured by “consensus politics”, leaving no room for anyone to stand up against sustainability (Swyngedouw, 2009). The social science are a particularly rewarding area of study, as they now give ample consideration to environmental and sustainability matters, to the extent that sub-disciplines and interdisciplinary fields of study such as the environmental humanities have blossomed (Choné *et al.*, 2016, 2017). Yet they have seldom been subjected to bibliometric research, unlike the environmental sciences (Martin *et al.*, 2012; Wang *et al.*, 2012).
- 7 This paper is divided into four parts: the conceptual framework of the definition of the “sustainable city” (1), the methodology of the literature review (2), the main findings of the statistical and lexical analyses (3), and lastly new avenues for discussion (4).

1. Conceptual framework: Defining the “sustainable city”

- 8 On the one hand, general and generous principles for the future of the planet are put forward; policy-makers, firms, and associations all emphasize the importance of sustainability (Swyngedouw, 2009). On the other hand, implementation is lacking, and the objectives announced have yet to be reached. Economic growth remains the mantra of major global institutions of governance, as well as of many nation states. Indeed, sustainable cities became perceived as machines of economic growth in the 2000s. In terms of ecology, mostly technical innovations have been achieved, informed by the belief that we can still grow, but grow “greener”. Sustainable development today often creates “social injustices as unintended outcomes” (Pearsall *et al.*, 2012, p. 935) resulting from the neoliberalization of “best practices”. In this dual context, I propose to use lexicometric tools to go beyond the current denunciation of a “showcase effect”.
- 9 Researchers are faced with the difficult task of investigating on four interacting levels: the social and environmental changes experienced in practice by our societies and our planet; how they are perceived by various actors and institutions; how social science researchers acknowledge and analyze them (depending on disciplines, scientific paradigms, etc.); and the evolution of the conditions in which scholars produce social science research and the influence of professional incentives, as the world of academic journals has changed significantly – knowing that this can create biases (“publish or perish”, funding on a project-by-project basis, the journals’ impact factors, etc.: Lévêque 2013, p. 115–124; Larrère and Larrère, 2015, p. 231–232).
- 10 This requires making choices that determine the scope of validity of the approach used for this research. A bibliometric analysis of publications reveals not only scientific outputs, but subject categories and temporal trends in keyword usage in a field, for instance urbanization studies (Wang *et al.*, 2012), especially when the amount of books and articles on a subject has skyrocketed and reflects the interdisciplinary nature of a domain (Liu *et al.*, 2012). In this paper, I focus on the “sustainable city” concept in the 2000s, particularly after the economic crisis of 2007–2008 and until 2014. My concern is to map out connections between its numerous conceptual and thematic variants rather than simply to follow the uses of the term across time. The city has progressively come to prevail as an important locus of the interconnection between economics, ecology and social policy under the helm of sustainability (Baker and Eckerberg, 2008; Hamman, 2009). References circulate across borders among elected representatives and professionals of the city (experts, technicians, architects...), such as the European Sustainable Cities and Towns Campaign that led to the 1994 Aalborg Charter, in which signatory municipalities formally committed to setting up Local Agendas 21² (Lafferty, 2001). The “sustainable city” also constitutes an area of research that has attracted the interest of scholars in urban studies (Bridge and Watson, 2011; Cook and Swyngedouw, 2014) as well as others working on environmental issues and sustainable development (Rydin, 2007; Bothwell, 2015; Choné *et al.*, 2016, 2017). In order not to rely on preconceptions on what belongs to the “sustainability” field and what doesn’t, I sought to go back to the sources by looking at scientific journals, considering them as supports of research *in progress*.

2. Methodology of the literature review

- 11 Bibliometrics gives us insights into how disciplinary and/or thematic fields are structured and change, by conducting keyword analysis on a defined sample of journals. For instance, Kamalski and Kirby identified distinct spheres of “urban knowledge” that contain some overlap but also significant differences for the development of urban studies, and concluded:

“Some scientific research might benefit from thinking about the city at scales such as the neighborhood; conversely, more explicitly urban work must engage with environmental issues and, explicitly, the development of the literature on sustainability, resilience and adaptation” (2012, p. S8).

- 12 In this paper, I adopted a quantitative approach to papers dealing with the “sustainable city” in journals suitable to comparative interpretation. I studied both English- and French-language journals published over the 2009–2014 period; considering the number of references, in order to maintain a balance between the two corpuses, I also took into account 2004–2008 French-language publications. This does not create biases because the two corpuses are analyzed separately. My objective is not to address the medium term – for instance a 20-year period – by focusing on a single discipline or journal, like Kirby, who emphasized the relevance of bibliometrics for a better understanding of urban studies based on one journal, and how it operates to provide meta-analysis of the field, especially for political geography (Kirby, 2012). Similarly, my intent here is not to test one type of change among others, like global research trends in urbanization (Liu *et al.*, 2012; Wang *et al.*, 2012). Instead I set out to characterize the variety of processes at work in the language of urban sustainability since the 2008 economic crisis, i.e., over a short period and using a rather broad disciplinary scope in the social sciences. This approach has kinships with others in environmental sciences, such as the global distribution of ecological studies analyzed by Martin *et al.* (2012). Based on 2573 terrestrial study sites reported in ten highly cited ecology journals over a five-year period (2004–2009), they found evidence of several geographical biases, including overrepresentation of protected areas, temperate deciduous woodlands, and wealthy countries, that may limit the scalability of ecological theory.
- 13 I gathered the material from the free-access journals’ websites and from the *BibCNRS* portal of the CNRS (French national center for scientific research) (<https://bib.cnrs.fr/>). As a result, the corpus includes mostly Western sources and could later be fruitfully complemented by material from other socio-cultural areas in order to rethink urban sustainability in a globalized world (Martinez-Alier, 2014; Larrère and Larrère, 2015, p. 263–330).
- 14 18 journals (Table 1) were selected on the basis of three criteria. First, they had to be specialized in urban, environmental and/or local issues, to enable retracing the trajectories of concepts across different publications and over several years. Journals with a more generalist scope were therefore left out of the corpus.³ Secondly, they had to be social science journals, and specifically in the field of sociology, geography or urban studies. Thirdly, in order to support the hypothesis that publications are indicators of the rise (or fall) of approaches to sustainability, they are internationally referenced, peer-reviewed journals.

Table 1 – List of the corpus of 18 journals

English-language journals
<i>Cities</i>
<i>Environment and Planning A</i>
<i>European Urban and Regional Studies</i>
<i>International Journal of Urban and Regional Research (IJURR)</i>
<i>Local Environment</i>
<i>Society and Natural Resources</i>
<i>Sustainable Development</i>
<i>Urban Research and Practice</i>
<i>Urban Studies</i>
French-language journals
<i>Développement durable et territoires</i>
<i>Environnement urbain / Urban Environment</i>
<i>Espace, populations, sociétés</i>
<i>Espaces et sociétés</i>
<i>Métropolitiques</i>
<i>Natures sciences sociétés</i>
<i>Noréis – environnement, aménagement, société</i>
<i>Territoires en mouvement</i>
<i>VertigO – La revue électronique en sciences de l'environnement</i>

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- 15 The corpus includes papers initially identified by their positioning at the intersection of two rather broad sets of themes: city/urban *and* sustainable/environment (in English and French).⁴ I left out editorials and book reviews, in order to avoid duplications and citations or comments on papers.⁵ On this basis, I did two complementary searches. First, I looked for all terms relating to the “sustainable city” identified by the search engines in order to have a complete database at my disposal [called B2]. Secondly, after systematically scanning the titles, keywords and abstracts of papers, I selected 772 papers [making up the abridged database B1] that address *as such* one or several aspects of the “sustainable city” – as opposed to merely mentioning a related term in the text, in the notes or in the reference list (which is the case for some papers included in [B2]).

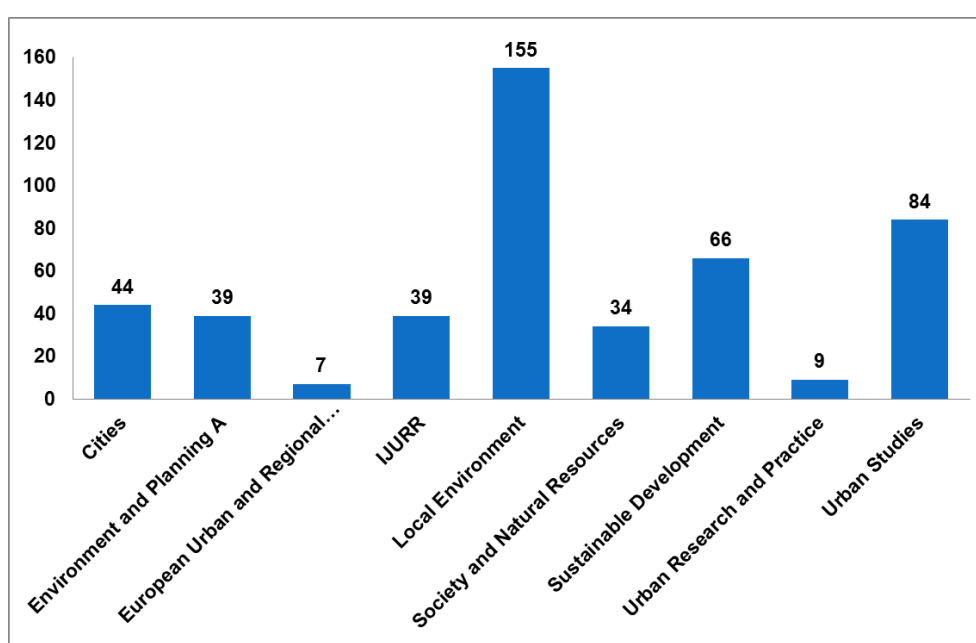
3. Main findings of the statistical and lexical analyses

3.1 Statistical analysis of the recurrence of the “sustainable city” in [B1]

- 16 The corpus of 772 papers allows us to assess the scope of discussion on the “sustainable city” in English and French-language journals, considered jointly and separately.

- 17 Among the English-language journals, *Local Environment*, *Urban Studies* and *Sustainable Development* devote the most papers to the “sustainable city” field (even if we know that the overall annual number of papers published varies from one journal to the next). Figure 1 confirms the prominence of these occurrences both in journals with an openly stated environmental or sustainable approach (*Local Environment* is subtitled *The International Journal of Justice and Sustainability*; or *Sustainable Development*) and in urban studies journals (starting with *Urban Studies*).⁶ Likewise, the journals *Cities* – which focuses on urban policies –, *IJURR* – which is characterized by its critical approach to urban and regional issues –, *Society and Natural Resources* and *Environment and Planning A* – at the interface of nature and society, respectively environmental studies and planning – have produced an almost equivalent number of dedicated papers: between 34 and 44 in six years.

Figure 1 – Number of papers mentioning the “sustainable city” in the English-language corpus (2009–2014)

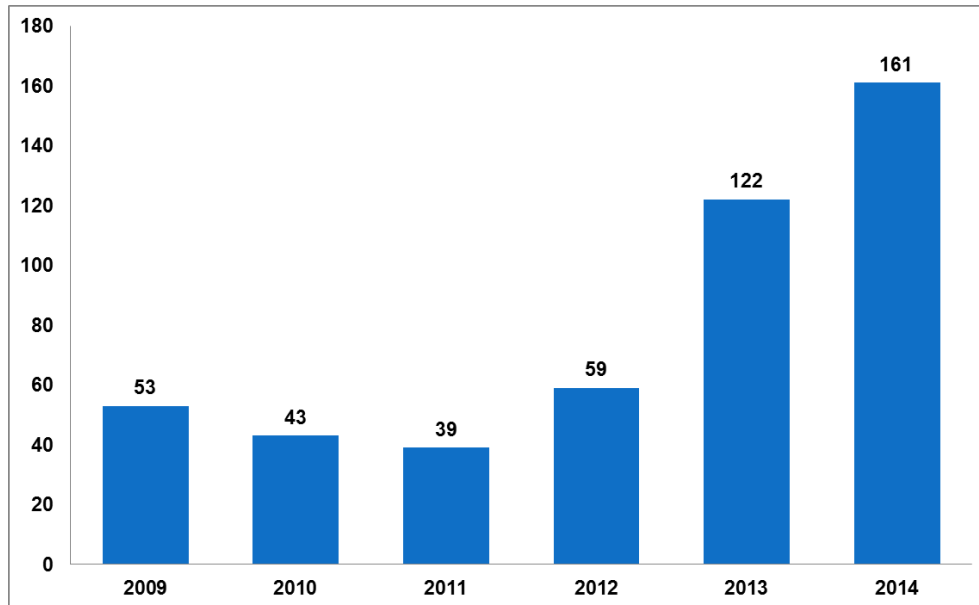


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- 18 If we look at trends (Figure 2), the number of papers addressing these issues decreased between 2009 and 2011, the years that followed the financial crisis of 2007–2008, a period that was conducive to the expression of concerns about the role of “sustainability”, as criticisms were voiced on its appropriation by international bodies in the name of “good practices” and its use as an urban marketing tool serving as a weapon in the competition between local authorities. The number of papers increased again in 2012; this can be explained by the exposure given to these issues in the public debate, for instance with the Rio+20 Conference. The trend increased sharply in 2013–2014, to the extent that the number of papers ultimately tripled between 2009 and 2014. Admittedly, we cannot assume that an article published during a given year was written that same year or just a few months before, as journals’ evaluation processes and publication schedules vary in timing. Precisely to account for this potential bias, we picked journals that focus on urban and environmental issues rather than generalist ones, as they are better suited to

approaching constantly shifting themes and paradigms – particularly online journals and ones that publish *online first*. This limits the margin of uncertainty of the trends observed.

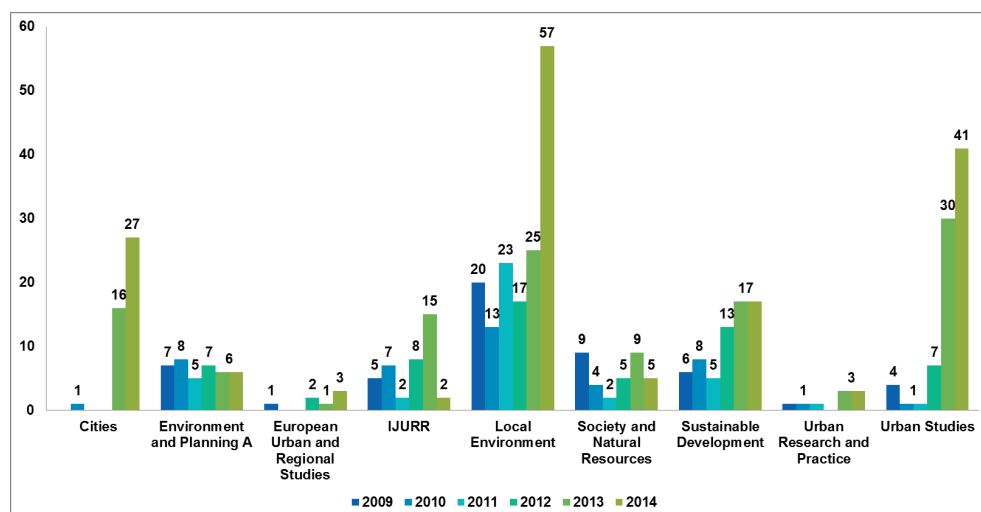
Figure 2 – Number of papers mentioning the “sustainable city” in the English-language corpus per year



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- 19 Examination of occurrences on a journal-by-journal basis confirms this result (Figure 3). A downward trend or low number of occurrences followed by a noticeable recent increase can be observed for the journals that publish the most papers on the “sustainable city”, regardless of whether they are focused on the urban (particularly *Urban Studies* and *Cities*) or on the environmental dimension (*Local Environment*, *Sustainable Development...*). In the 2014 issues of *Local Environment*, the number of relevant papers has more than doubled compared to 2013 (from 25 to 57); *Urban Studies* had four times more papers on these issues in 2013 than in 2012 – the increase continued in 2014 (from 30 to 41). Such a progression reflects the status of sustainability as the prime response to the constant calls for thinking and acting for our planet’s future, as well as the emergence of new alternatives in the context of the “ecological crisis” (see Table 2).

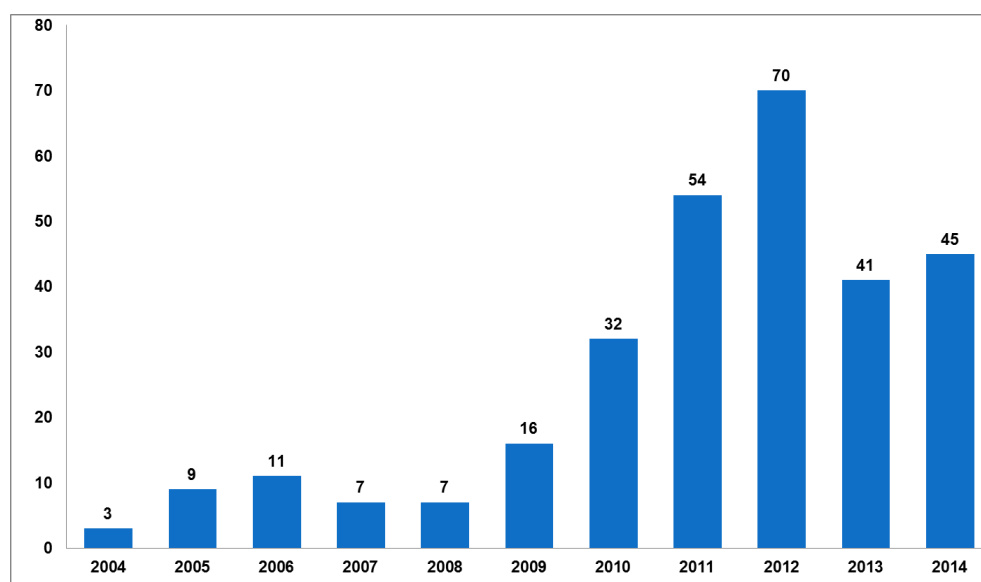
Figure 3 – Evolution of the number of papers mentioning the “sustainable city” in the English-language corpus by year and by journal



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- 20 French-language journals are also characterized by two phases in the use of the “sustainable city”: a sharp increase from 2008 to 2012, the year of the Rio+20 Conference (from 7 to 70 papers), then a drop since 2012, yet with numbers that exceed those of the pre-2009 period (for instance, 7 papers in 2008; 45 in 2014): examination of the years 2004–2008 confirms this, with a small, stable number of occurrences (Figure 4). Unlike in the English-language international journals, there was no decrease at the time of the global economic crisis (2008), but actually an increase, and the subject has remained an important matter of debate since.

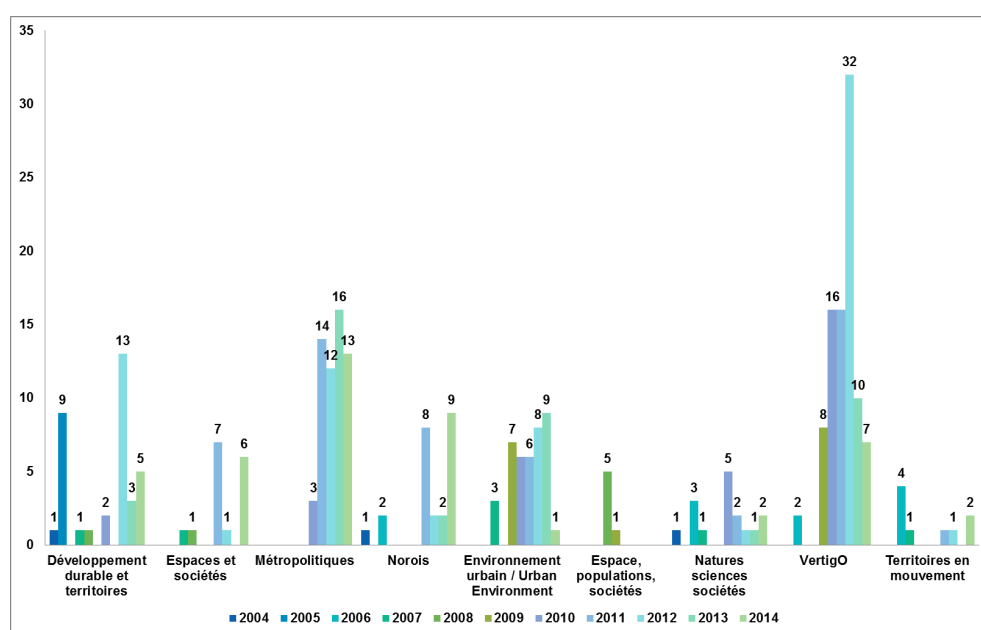
Figure 4 – Number of papers mentioning the “sustainable city” in the French-language corpus (2004–2014)



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- 21 This observation is verified on a journal-by-journal basis (Figure 5), with a high number of publications both in the environmental (*VertigO*) and the urban field (*Métropolitiques*), showing the increasing relevance of the sustainable/city association. *VertigO* stands out as the French-language journal that publishes the most papers on the subject, with a sharp rise between 2008 and 2012, and then a drop back to 2009 levels. *Métropolitiques*, which was launched in 2010, ranks second, with a stable and fairly high number of occurrences since 2011 (between 12 and 16 papers per year). A similar trend can be noted for journals at the intersection of different fields: *Développement durable et territoires*, *Environnement urbain* and, with fewer occurrences, *Noroi*, *Natures sciences sociétés* and *Espaces et sociétés*. These numbers reflect the popularity of the sustainable development repertoire in the French-language literature, but also its controversial character (see Table 2).

Figure 5 – Evolution of the number of papers mentioning the “sustainable city” in the French-language corpus by year and by journal



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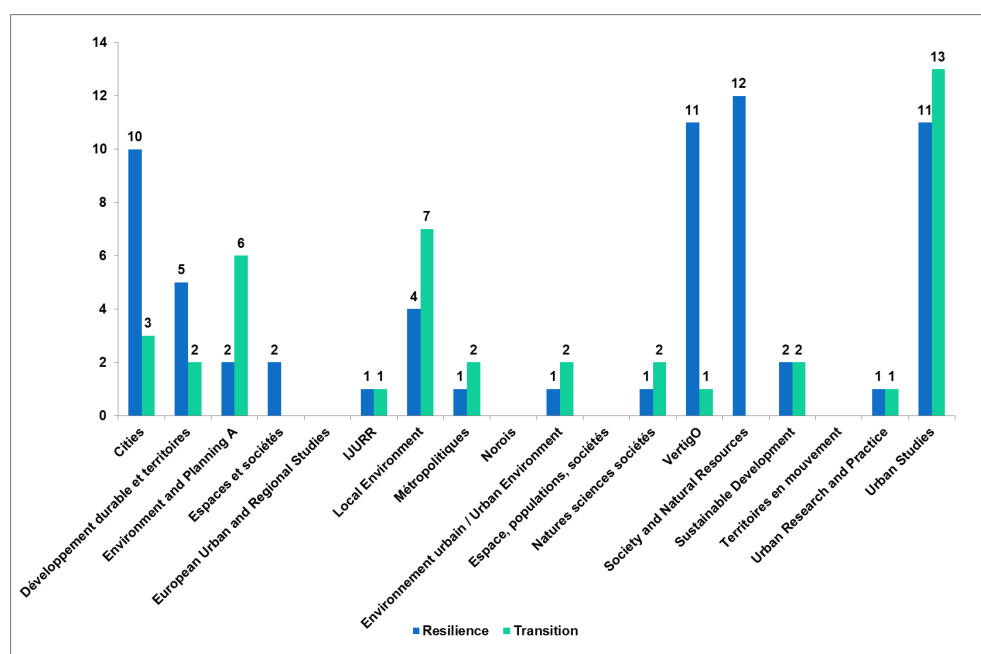
3.2 Statistical analysis of areas studied in [B1]

- 22 In the studied corpus, a majority of papers (59%) discusses Northern areas and countries; 21% discuss a variety of Southern cities. In 17% of cases, analyses are theoretical and not supported by a specific fieldwork. Very few comparative North/South studies are found: barely 2%, i.e., 16 out of 772 papers. In terms of level of analysis, national and infra-national studies are the most frequent. Correlations can be observed between the countries under study and between English- and French-language publications. Half of the papers published in French-language journals rely on fieldwork conducted in France; 11% from other countries in the EU; only 20.8% from outside of the EU. Likewise, over 40% of the papers published in English-language journals rely on fieldwork conducted in English-speaking countries. In that sense, the two groups of journals considered together offer the opportunity to test the conceptual consistency of the sustainability “model” and its evolutions.

3.3 Alternatives to urban sustainability? Statistical analyses based on [B1] and [B2]

- 23 Bibliometric analysis also enables investigation of other concepts used to discuss issues surrounding the “sustainable city”, such as urban resilience and transition – fashionable concepts in the transition towns movement, which calls for redeploying a sustainable local economy.⁷ These two alternative concepts are far behind sustainability in the corpus of 772 papers: 64 papers discuss urban resilience, 42 address cities and transition (Figure 6).

Figure 6 – Occurrences of the concepts of urban “resilience” and “transition” in [B1]



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- 24 This initial overview suggests that the scope of these conceptual alternatives remains fairly narrow. To dig deeper, I searched in [B1] for the frequency of post-2008 (global economic crisis) occurrences of terms (in both languages) combining “city” and “sustainability” in the broader sense (ville_ and _city column), particularly “green city” and “smart city” (Table 2). This reveals a continued increase in the number of papers mobilizing or discussing terms other than “sustainable development”, particularly noticeable in 2013–2014. “Sustainability” clearly dominates without being used exclusively; other concepts are rather used to specify certain aspects.

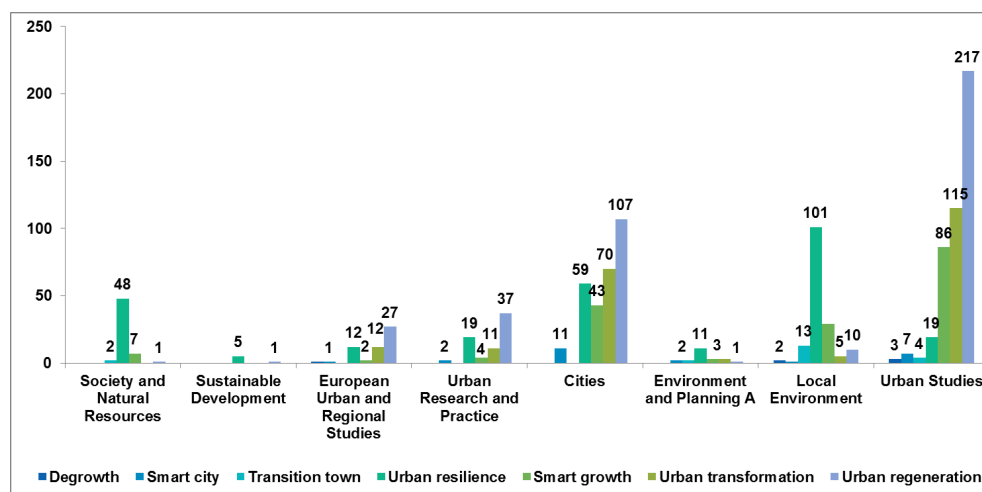
Table 2 – Terms associated with urban sustainability in [B1] (2009–2014)

Year	Ville or city	Smart city or ville intelligente	Sustainable or durable	Urban environment or Environnement (+) urbain	Transition	Resilience or résilience	Green + city/ nature en ville or ville durable
2009	3		40	8	1	2	36
2010	8		46	2	1	5	37
2011	17	1	60	5	3	4	50
2012	12	1	67	3	7	10	70
2013	27	3	81	10	9	20	87
2014	32	5	122	13	21	20	106
Total	99	10	416	41	42	61	386

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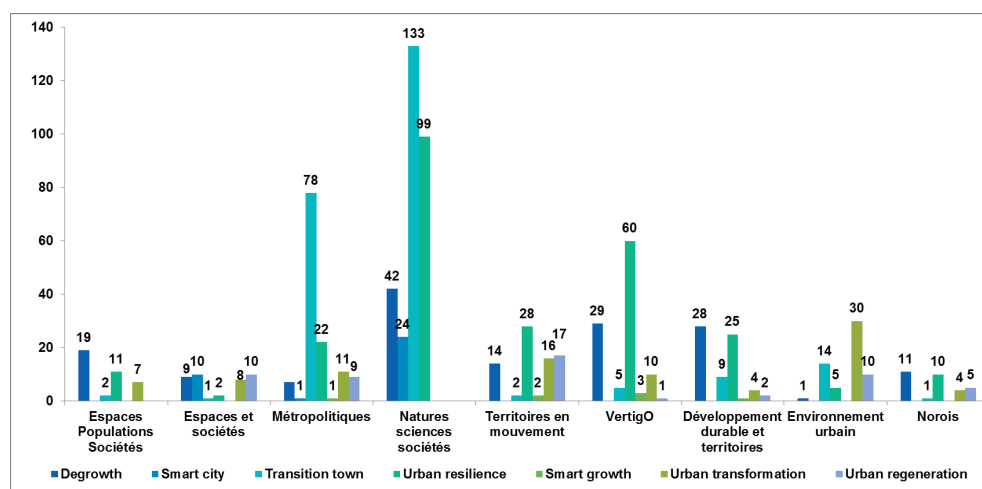
- 25 Secondly, I entered the following terms in the journals' search engines (without sorting the papers by relevance): degrowth, smart city, transition town, ecological transition, smart growth, urban transformation, urban regeneration (and their French equivalents). First, I identified the number of items in the full text of all papers published in the 18 journals during the period under study [B2] (Figures 7–8); then I looked for each item in all abstracts, to assess whether the concept was the subject of substantial analysis (and not just referenced in passing) (Figures 9–10).⁸
- 26 Figures 7–8 show that the terms researched can be found in most journals in the corpus⁹, not just in one or two of them: they really play a role in the debates. However, the comparison between full text (Figures 7–8) and abstracts (Figures 9–10) reveals they are not necessarily used as centrally structuring concepts, and more often in correlation with the register of urban sustainability. This applies to English- and French-language journals alike. “Urban resilience” appears in abstracts in many journals; to a lesser degree, this is also the case of “transformation” and “regeneration” (particularly in the English-language output). Sustainable *development* is called into question only to a limited extent, judging from the occurrences of related concepts such as transition, transformation or smart growth; the small number of occurrences of “degrowth” confirms this.

Figure 7 – Recurrence of concepts associated with the “sustainable city” in the full text papers of English-language journals of [B2]



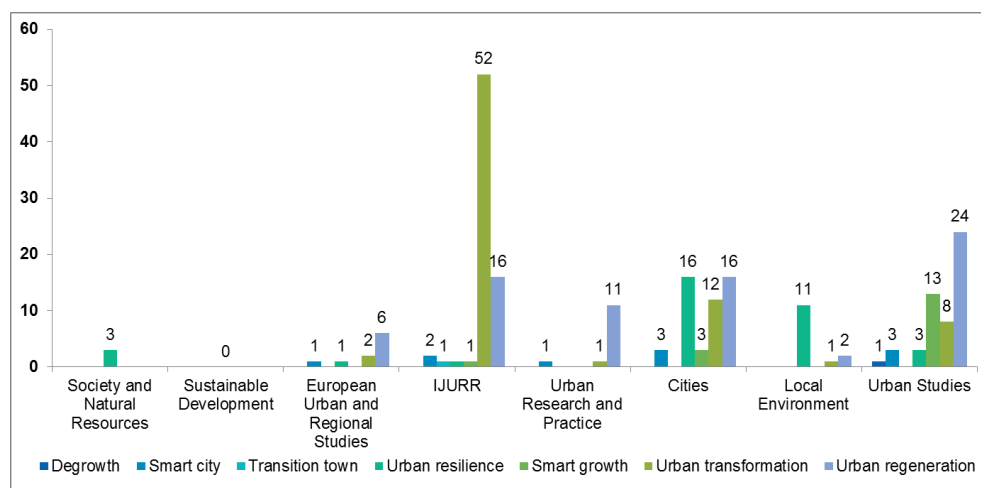
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Figure 8 – Recurrence of concepts associated with the “sustainable city” in the full text papers of French-language journals of [B2]



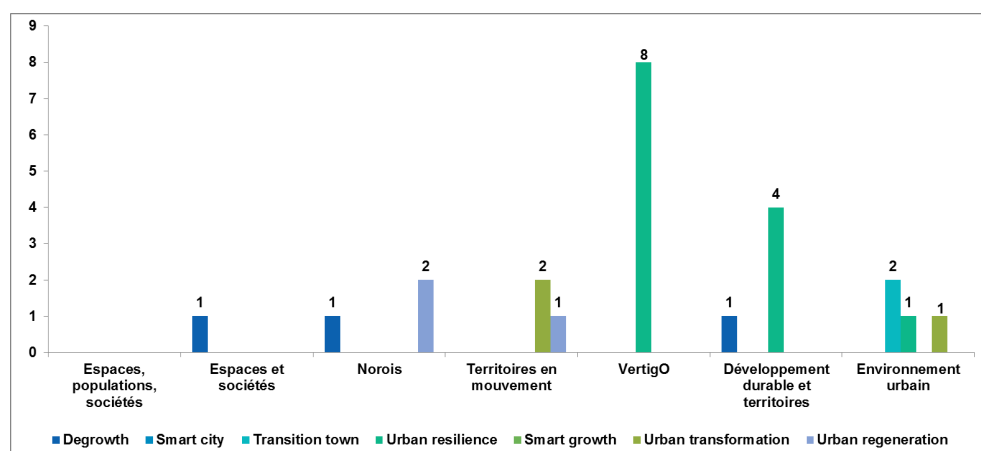
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Figure 9 – Recurrence of concepts associated with the “sustainable city” in the abstracts of English-language journals of [B2]



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Figure 10 – Recurrence of concepts associated with the “sustainable city” in the abstracts of French-language journals of [B2]



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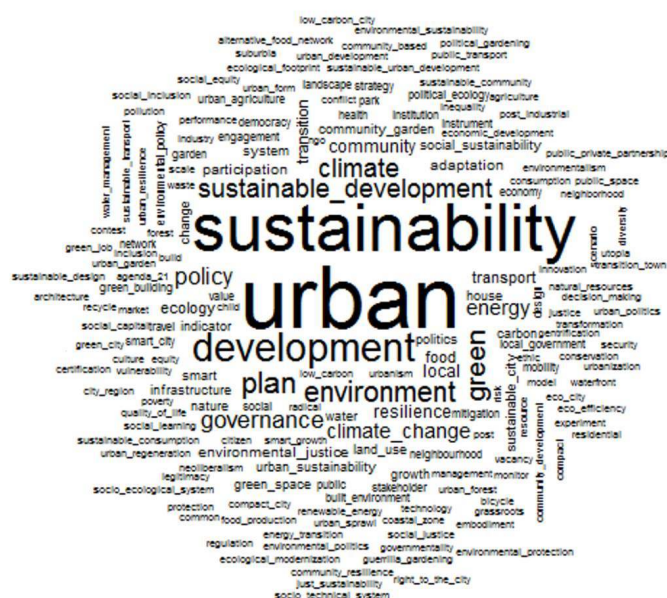
3.4 Lexical analysis of the occurrences of the “sustainable city” based on [B1]

- 27 Sustainable development can be considered as an *umbrella concept*, specified by an array of terms that emphasize various dimensions. Lexicographic analysis conducted with the IRaMuTeQ¹⁰ software gives more insights into this.
- 28 Based on [B1], the analysis of the English-language corpus identifies 728 forms among 3121 occurrences, including 457 hapaxes (words occurring only once) (14.51% of occurrences and 62% of forms). Examination of the French-language corpus yields 519 forms out of 2043 occurrences, including 307 hapaxes (15.03% of occurrences and 59.15% of forms). The most frequently found lemmatized form (including different word forms: noun, verb, plural, etc.) is, both in English and French, urban/urbain, with respectively

287 and 157 occurrences, followed by sustainability/durabilité (212 and 107 occurrences), and development/développement (110 and 80 occurrences).

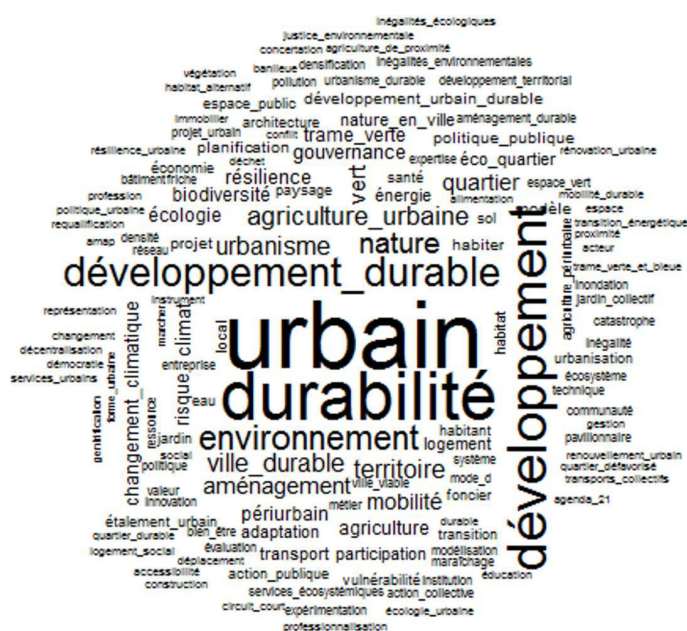
- 29 Two representations are based on distinct protocols. The word clouds obtained from the French and English corpuses [B1] offer a visualization of the most frequent keywords; the more they recur, the bigger they appear (Figures 11–12). They are indicators of the relative importance of terms and subjects.

Figure 11 – Terms most often associated with the “sustainable city” in the English-language journals of [B1]



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Figure 12 – Terms most often associated with the “sustainable city” in the French-language journals of [B1]



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- 30 Although they provide an analysis of density, the word clouds do not take into account the relationships between terms. The similarity analysis (Figures 13–14), based on the strength of the ties between two terms, makes this additional step possible: the greater the relation between two terms, the higher the number of co-occurrences.

31 There are five main conclusions to be drawn. First, the lasting recourse to the repertoire of sustainability in the discussion of urban issues is established, as well as the predominance of an approach in terms of sustainable development (particularly in the French-language literature, where it is the fourth most frequent lemmatized form with 59 occurrences; it ranks seventh in the English-language corpus with 65 occurrences).

32 Secondly: sustainable development is not the only concept used in the repertoire of sustainability as is shown by gaps between the occurrences of development, sustainability and sustainable development – particularly in the English-language literature (Figures 11–12). The similarity analysis confirms this, showing that the register of development is a branch of sustainability (clearly the strongest) and not the other way around (for instance, there are few occurrences of urban development as such: 12 in English, 11 in French) (Figures 13–14).

33 Thirdly, the distinctive recurrence of the forms environment/environnement (fifth most frequent lemmatized form: 76 and 46 occurrences) and green/nature (sixth most frequent lemmatized form: 70 and 37 occurrences) reflects the role of the environmental dimension in so-called “sustainable” public policy and its analyses (Hamman, 2012; Hajek *et al.*, 2015).

34 Fourthly, even if fewer co-occurrences are observed than for sustainability/durabilité, the terms environment, resilience, transition, nature, green and smart appear to be directly associated with urban/urbain (Figures 13–14). Their use is therefore not mechanically correlated with that of sustainability in the English-language corpus; this also applies to the French-language corpus, but to a lesser extent (which corroborates the first

conclusion). For instance, the register of *transition* and its offshoots *energy transition* and *transition town* are associated with *urban* in the representation of similarities in the English-language corpus, but with *sustainability* (not *urban*) in the French-language corpus, where the authors appear to reason on the basis of sustainability as a central concept instead of relying on other conceptual approaches, such as transition, to address urban issues.

- 35 Lastly, the existence of possible alternatives to the sustainability repertoire is also reflected in the corpus, although the latter does not include “activist” publications (such as associative journals of degrowth activists) and the papers’ approaches tend to focus on public policy, urban planning and participation. For instance, governance appears 60 times as a lemmatized form in the English-language corpus and 20 times in the French-language corpus. The register of urban sustainability also encounters resistance, but this only appears indirectly if we look at the lemmatized forms: there are 22 occurrences of *environmental justice* in the English-language corpus, and only 6 of *conflict*. Likewise, in the French-language corpus, only 6 occurrences of *inégalités environnementales* and 4 of *conflit* and *quartier défavorisé* are found.

4. Discussion: Rethinking the construction of knowledge on sustainability

- 36 It is always necessary to contrast these bibliometric findings with the contents of articles in the corpus as well as significant books published in recent years, to ensure meaningful interpretation by considering different types of publication (Kamalski and Kirby, 2012). To do so, this section will consider the construction of sustainability by investigating two related questions: (i) Has the “sustainable city” come to prevail as an overarching concept under which other terms fall? (ii) Can we observe the emergence of approaches other than sustainable development and sustainability?

4.1 Figures of the “sustainable city”

- 37 I identify the main figures of the city associated with “sustainable”. These terms have been both more numerous and more frequently used in the literature in the past few years, as is exemplified by recent handbooks¹¹ and Table 2 above. Depending on the papers, a wide range of phrases accompany the generic term sustainability:
- some emphasize substantial aspects, such as *low carbon city* or *urban farming*, or procedural aspects, such as *multicultural*, *retrofitting* or *innovative city*.
 - some inscribe sustainability in dynamics to follow (without necessarily using the term *sustainable development*) – for instance *future city*, *adaptive city*, *transition town*.
 - two qualifying forms – negative and (mostly) positive – appear as dichotomies: *diffuse/compact city*, *sanitary/sustainable city*, *divided/just city* or *automobile/cool city*, etc., one that should be left behind, and one we should strive towards. This reflects the *normative* dimension of sustainability, as a global project (*world city*?) that involves the control of individual behaviors under the guise of a post-political discourse on the common good. This control even applies to the intimate spheres, for instance regarding food production and practices (*garden city*) or energy consumption (Christen and Hamman, 2015).

- 38 These findings update a model formulated by Haughton (1997), who discussed self-reliance, compact cities, pollution trading, and the equitable balance city in terms of environmental impact. The keyword analysis conducted in this study evidences *five main variants* (Figures 11 to 14):
- the “*recyclable city*”, with an economic inspiration (as *sustainable development*) emphasized by terms such as *adaptive, global, innovative, low carbon, postindustrial, retrofitting* and *smart city*. These refer to a city that can renew itself without requiring growing investments and induce disruptions in the process (*viable city*, transition without disruption, short supply chains in the city, urban material flows, *slow city*...)¹²;
 - the “*compact city*” in the urban fabric (sustainable urbanism and architecture, housing, mobility...) as a response to the sprawl of urban areas (and by extension the consumption of space: *compact vs. automobile city* and *diffuse city*) – even if discordant voices exist (Burton, 2000);
 - the “*green city*”, which reflects both (i) the greening process in certain sectors of cities with “globalized” references (Blok, 2012): green parks and infrastructure, associated with the language of quality of life (*desirable city*), as well as housing, transport, farming; and (ii) the success of the environmental and ecological register (*urban environment, green city, urban ecology*...) in the discourses and experiences analyzed: energy-saving buildings, eco-districts, energy transition...;
 - the “*just city*”, which reassesses the place of the social dimension in sustainability (though it remains comparatively small) and connects it with ecological issues, in order to remedy the socio-spatial segregations correlated with environmental inequalities (*child friendly, friendly, cool, happy, liveable, multicultural city*);
 - the “*participatory city*” which calls for active citizenship (*conscious, multicultural city*), albeit one that remains within the framework of local democracy apparatuses – for instance dealing with learning and governing environmental citizenship (Cao, 2015). Emphasis is laid on procedural issues (*postpolitical city*) and on the governance of sustainability.
- 39 These five variants are often conflicting, and each term is subject to debates in the literature: hence the growing frequency in their use, reflected by the bibliometric analysis, and complemented by the analysis of paper abstracts in [B1]. For instance, the *recyclable city* raises the question of anticipation in urban policies: should cities save on resources or pursue investments in infrastructure encouraging more sustainable practices? This dilemma is exemplified by the construction of tramway lines: developing a new district in a city and connecting it to the city center with a tramway line immediately can be seen either as expanding urban sprawl or as anticipating the need for an alternative to car traffic (Hamman, 2015). The *compact city* is likewise not a subject of consensus: densification is generally not welcomed by residents; the attention to “nature in the city” leads to greener but more sprawling urban areas (green infrastructure, biodiversity conversation spaces, etc.). The same goes for the environmental repertoire. Some of the most prominent eco-districts, particularly in Northern Europe, have increased socio-spatial disparities in cities, between those who can afford to live there and those who can’t (Emelianoff and Stegassy, 2010). Regarding the *just city*, “social mixing” has also attracted criticism: policy-makers are often accused of using social housing for the benefit of the solvent middle class instead of addressing precariousness and ghettoization in underprivileged areas.
- 40 Lastly, the *participation* of local residents in urban policies in some cases merely consists in passing on information to them after the decisions have already been taken, or in

incentives to comply with “good practices” (for instance cutting down on domestic energy consumption to be “proactive” in protecting the planet), without giving them any actual leverage in decision-making processes. This can reinforce a sense of powerlessness in facing the ecological crisis and the often technical discourses of policy-makers and experts, as in the case of renewable energy (Christen and Hamman, 2015).

- 41 Ultimately, the “sustainable city” always refers to processes that are permanently *in the making*. On the one hand, it is a *transitional* concept – in a temporal dimension where the positioning in a dialectic of adaptation vs. rupture, which characterizes the dynamics of socio-ecological change (Lockie *et al.*, 2014, p. 95–105), varies according to uses and contexts. On the other hand, it is also a *transactional* concept – in socio-spatial settings where transactions between actors, groups and institutions result in compromises for coexistence that at any given time can be extended or called into question; in these compromises not only is the Other considered as a party to the interaction, but their difference is acknowledged (Hamman, 2015).

4.2 Alternatives to the register of “urban sustainability”?

- 42 The catch-all character of the term “sustainable”, which facilitates its diffusion, calls into question the very possibility of an alternative. The alternative registers identified by the statistical and lexical analyses (Figures 6 to 14) allow us to evidence their uses depending on institutions and social groups. They appear to be either specific to restricted sectors or characterized by a somewhat binary vision.
- 43 (i) Owing to the divergence from sustainable development regarding the compatibility between sustainability and growth (*green growth* or even *green city*), *degrowth* appears to be the most clear-cut alternative, unless we consider that degrowth pre-existed sustainability, in the 1970s (for instance, Georgescu-Roegen, 1971) and even long before that, as a critique of progress and modernity that emerged in both right-wing and left-wing political and philosophical movements (Bourg and Fragnière, 2014, part 2). Little attention has been paid to degrowth in our corpus in the past few years; occurrences of related concepts such as *retrofitting* and *shrinking city* can be noted, but the word clouds (Figures 11–12) and the search for concepts in full texts (Figures 7–8) yield a small number of occurrences. Likewise, there is little discussion of the shift from *degrowth* to *altergrowth*, in a time of economic crisis and of *alter-globalization*. Rather, the register of social and environmental justice is prevalent (*just city*), in the work of North American researchers following in the footsteps of Robert Bullard (2000), who highlight the link between ethnic communities and ecological inequalities in underprivileged Western neighborhoods, but also in research on North-South economic inequalities in the era of economic globalization and environmental threats (Martinez-Alier, 2014).
- 44 (ii) *Resilience*, dating back to the works of ecologist Crawford S. Holling (1973), has been refashioned to address the city and the economic crisis. There is a direct systematic analogy with nature, regarding its capacity of returning to a former state (not necessarily its initial state) after a natural disaster, pollution or even a major political transformation, but with a backdrop of psychology. There is lingering ambiguity between the potential meanings of individual and institutional resilience; in the second case there might be a risk to confer a “green” legitimacy (i.e. uses of *green city* discourses) on resistances to change, as has been pointed out by analysts of path dependencies, for instance in the field of urban energy systems (Palm, 2006).

- 45 Moreover, this posture neglects the unequal abilities of actors to adjust, i.e. social and environmental inequalities dealing with the *just city*. This raises the question of whether resilience is a real solution to sustainability issues, or if thinking in terms of adaptation (*adaptive city*) constitutes an admission of weakness (i.e. having to manage the vulnerability evidenced in our environment). Finally, one can consider that the natural system-derived concept of resilience lacks transferability to the urban domain because, although it is applicable in terms of shocks, e.g. disaster resilience, it implies preserving an existing system to some extent (Holling, 1973), whereas significant changes are nowadays believed necessary in cities – hence the use of *transition*, a term not used for natural systems, where restoration is privileged (Mathevet and Bousquet, 2014).
- 46 (iii) *Sustainable transformation* is another popular concept, exemplified by “Transformations to Sustainability”, a global research funding programme launched in 2014 by the International Social Science Council¹³. The language of transformation found in the corpus (*urban transformation*) has similarities with resilience. Emphasizing the complexity of socio-ecological systems, it addresses two options for change: adaptation in the face of disruptions and the creation of a new system. The question is especially raised in the domain of energy and oil crisis, if we should adjust to new conditions or consider a transformation. This sheds new light on the economic register of the *recyclable* or *adaptive city*, but, again, the debate is phrased in terms of a duality.
- 47 (iv) The concept of *transition* can be seen as semantically opposed to resilience, as it calls for “migrating towards” rather than “going back to” something. In the current economic context, it crucially emphasizes that one cannot simply call for “revolutions”¹⁴ to move on or fuel catastrophism without inciting severe counter-productive reactions (for instance regarding *compact city*). Public policy-makers are thus left with transition, which has become a new buzzword in the fields of ecology and energy (Figures 13–14). The same appears with sustainable development, which has a normative dimension, specifically if we consider that resilience and transition selectively emphasize aspects of sustainability among others (Theys, 2014). We might return to the binary tension between the techno- and eco-centric interpretations, with adaptation through technical innovation – transaction in continuity – vs. a “decolonization of natural systems” with less emphasis on technology (Fischer-Kowalski *et al.*, 1997) and the promotion of social ties – transaction in disruption.
- 48 In this sense, the field of *sustainability transitions* reveals three main salient issues: first, the frequent confusion between innovation and socio-technological innovation (particularly with the *recyclable city*), at the expense of more critical models of social change; then, the tendency to use apoliticism as a front, i.e., through the greening of public policy (*green city* or *compact city*) sweeping under the rug the power relations inherent in all urban sustainable processes (*participatory city* and *just city*); lastly, the constant appropriations of social science theories by political and economic decision-makers, as well as conversely the pervading influence of public discourse in the academic field. They remind us that these terms are never only about describing reality; they are also about steering it (Audet, 2015).

Conclusion

- 49 The keyword analysis shows “sustainable city” to be an overarching concept that comes in a wide range of variants according to temporal and spatial contexts, priorities of action and actors. Its content and implementation also varies. There is ultimately no single meaning and model of urban sustainability that emerges in the literature. The bibliometric approach enables us to reconsider the debates around the interactions between the three main forms of sustainability – economic, environmental and social – using diverse terms and experiments that stand out in the statistical and lexical analyses: *recyclable city*, *compact city*, *green city*, *just city* and *participatory city*. These terms do not necessarily overlap in practice and are surrounded by multiple controversies, which nevertheless confirm the relevance of the uses of *urban sustainability*, if not of *urban sustainable development* itself. That other terms have emerged does not directly reflect the reality of viable alternatives: *degrowth*, *resilience*, *sustainable transformation* and *transition* have not marked strong paradigmatic or cognitive shifts so far.
- 50 The guiding thread of our hypothesis on the (re)definitions of the “sustainable city” rather lies in the scope of *retro-innovations*, as social processes *in the making* through the withdrawal of technical artifacts and the emphasis on re-legitimated (environmental, collective...) practices. This goes further than the *retrofitting city* and beyond the critical economic approach of the *shrinking city*. Envisioning modernity in terms of “less...” or “without...” yields alternatives *by withdrawal* (including from economic competition, which does not mean withdrawing from the social field altogether) giving exposure *both* to forms of knowledge and to actors *to the detriment of others*. It is not a non-negotiable posture considered to be “above” politics as some promoters of the register of sustainability claim, even though they do not necessarily stray from the existing economic framework. Instead of defending a universal model, this approach reflects the complexity of what is at stake: on the one hand, it is impossible to find a way out of a paradigm (in this case, economic growth) without conceptualizing alternative practices and implementing them locally, particularly in urban spaces; on the other hand, without a change in values, we are bound to remain prisoners of dichotomies, mainly between recession and the destruction of nature (Jackson, 2009) – as I have noted in the four potential ‘alternatives’ to sustainability that appear in the corpus. The bibliometric study demonstrates that society and nature have a history that we should acknowledge (Pouchepadass, 1995; Choné *et al.*, 2017); we also should take into consideration the historical dimension of sustainability and of the concepts accompanying it since the 2000s. Having evidenced the dialectical relations between environmental, social, economic and even cultural aspects leads to a new task: identifying alternative paths for our societies.
- 51 Far from closing the debate, this perspective accounts for the depth of the social world and of interactions between human actors and the environment or even nature (Hajek *et al.*, 2015; Choné *et al.*, 2016, 2017), and suggests revisiting the continuity/disruption dyad (which remains stuck in the opposition between economic growth and degrowth, as well as between a technical and economic vs. an ecological and social version of urban sustainability) as a triad, with the possibility of innovations by withdrawal. Rather than transitions and transactions requiring additional devices and technologies – such as devices for energy “eco-efficiency” or negotiated pollution rights –, this means

reassessing natural cycles and entities, regarding issues and themes that stand out in the word clouds and similarity analyses: relocating urban material flows, local renewable energies (like wind farms and photovoltaic solar energy), urban agriculture and political gardening, etc. Ultimately the survey of the literature raises the issue of the place of the actors – researchers, policy-makers, and social groups in their diversity. It should become a crucial challenge in future research on sustainability.

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NOTES

1. <https://portals.iucn.org/library/sites/library/files/documents/2008-017.pdf> [Accessed 06 February 2017].
2. After the 1992 Rio Summit, 173 countries adopted the "Agenda 21", which is implemented through "Local Agendas 21" at the national, regional and municipal levels.
3. The publication of a paper in these journals shows recognition at a given moment, but it is difficult to conduct a longitudinal follow-up.
4. I do not consider "environment" to be a synonym of "sustainable"; this was merely designed to spot papers addressing urban and environmental issues (green city...).
5. In order to double-check the corpus, I also typed the following keywords in the journals' search engines: sustainable urban development; green city; urban resilience; transition town; ecological transition – développement urbain durable; nature en ville; résilience urbaine; ville en transition; transition écologique. No new papers were added to the corpus after these searches.

6. The journals with a specific focus on urban planning have fewer occurrences, but do not neglect these topics altogether (Urban Research and Practice, European Urban and Regional Studies).
 7. <https://www.transitionnetwork.org/> [Accessed 06 February 2017].
 8. However, for Natures sciences sociétés, Cities and Environnement urbain, searching abstracts only is impossible; the search always includes the keywords and title. In Métropolitiques and Environment and Planning A, it is not possible to enter such a request at all. I also left out Natures sciences sociétés, where searching for words and phrases is not an option.
 9. Figure 7 does not include IJURR, where the number of occurrences is far higher than in the other journals.
 10. IRaMuTeQ is an open-source software that compiles occurrences and considers proximities between terms; it offers graphical representations in the form of word clouds and similarity analyses.
 11. For instance, in Cities & Social Change, one of the four parts is called “The Livable City” and two chapters are entitled “Just Cities” and “The Good City?” (Paddison and McCann, 2014).
 12. K’Akumu considers an urban policy as “sustainable” when it supports the “normal natural cyclical functions” of an environment without “disruption or over-burdening” (2007, p. 222).
 13. <http://www.worldsocialscience.org/activities/transformations/> [Accessed 06 February 2017].
 14. This reflects more philosophical and activist approaches. Flipo for instance writes: “Everything happens as if, in practice, to change growth we need to go through what Sartre calls the ‘apocalypse’, the moment when a series is dissolved into a group in fusion [...], a revolutionary moment” (2014, p. 359).
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ABSTRACTS

This paper investigates evolutions in and alternatives to the “sustainable development” paradigm and examines these new trends. It offers a review of the social science literature that focuses on the language of the “sustainable city” used by researchers and experts in sociology, geography and urban studies since 2009. First, five main variants of “sustainable city” discourses are evidenced by the statistical and lexical analyses: the “recyclable city”, the “compact city”, the “green city”, the “just city” and the “participatory city”. They are often in conflict and subject to debate. Then, four main “alternatives” are identified: degrowth, resilience, sustainable transformation and transition. Yet they remain specific to restricted sectors or characterized by a binary vision.

L'article examine les évolutions et/ou alternatives au paradigme du « développement durable » en mobilisant une revue de la littérature de sciences sociales sur les énoncés de la « ville durable » parmi les chercheurs et experts en sociologie, géographie et études urbaines, depuis 2009. À partir d'analyses statistiques et lexicales, se dégagent, d'une part, cinq déclinaisons principales de la « ville durable » : « ville recyclable », « ville compacte », « ville verte », « ville juste » et « ville participative », souvent en tension et suscitant des controverses ; et, d'autre part, quatre principales « alternatives » : décroissance, résilience, transformation durable et transition, qui apparaissent propres à des lectures sectorielles ou marquées par une vision binaire.

INDEX

Mots-clés: ville durable, urbain, environnement, revue de littérature, analyse statistique et lexicale

Keywords: sustainable city, urban, environment, literature review, statistical and lexical analysis

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