

Research Article

URBAN SPRAWL BIBLIOMETRIC ANALYSIS AND STATISTICAL EVALUATION BASED ON CONTINENTS AND IN THE USA, CHINA AND INDIA

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ABSTRACT

Urban sprawl has been an essential debate in terms of its consequences and association to sustainable urban development. Urban sprawl is a multifaceted phenomenon and therefore has very little mutual global agreement in defining characteristics and impacts or on the undesirability premises. Urban sprawl literature has been overwhelming in the past decade, which is believed to be associated with the increment of global urban sprawl, especially to the country with an established economy and with recently experienced enormous economic transformation. The purpose of this article is twofold: to examine the association of urban sprawl and urban sprawl literature according to continece, and to carry out statistical evaluation of urban sprawl in the USA, China and India, based on three contemporary high-impact journals.

Keywords: urban sprawl, urban growth, economic growth.

INTRODUCTION

There is very little mutual recognition either on the definition of urban sprawl or in the significance and/or insignificance of the consequences. The extensive definition of urban sprawl was introduced by Ewing (1997) as he grouped it into three physiognomies: (i) leapfrog or scattered development; (ii) commercial strip development; and (iii) large expanses of low density or single-use development – also by their accessibility and open space functionality. This definition was clearly defined as a pattern of growth or development with spatial orientation. This definition innovatively associated a specific pattern that can be considered harmful or destructive in nature because growth control was not properly implemented. Ewing however did not specifically relate his description of pattern with the consequences of sprawl. Another definition that has been widely used was featured by the US Department of Housing and Urban Development (1999) – sprawl is a particular type of suburban development characterized by very low density settlement, for residential and non-residential; also characterized by a dominance of movement by use of private automobiles, unlimited outward expansion of new subdivisions, and segregation of land use by activity. This definition included a combination of observation of pattern of growth, the consequences of sprawl and the incapability of authorities to implement boundaries and land use restrictions. The specific type of suburban development was also meant to distinguish between urban sprawl and density neighborhood in the central business district (CBD). Urban sprawl is a multifaceted phenomenon; urban sprawl in the USA may not have the same characteristics as urban sprawl in Asia or Europe and vice versa. In the USA, early spatial forms of sprawl occurred after World War II because the new suburb was perceived to be safer, more desirable and cheaper than urban alternatives (Benites-Gambirazio 2017, Franklin and Plane 2019, Dibble *et al.*, 2019). In Asia, China and India have most

recently experienced the largest and most rapid urban sprawl because of their enormous economic transformation (You 2016, Lvet *al.*, 2016, Du 2017, Zhang and Xie 2019, Shao *et al.*, 2020). This article examines the association of urban sprawl and urban sprawl literature according to continece, and the trends of urban sprawl of the USA, China and India.

METHOD

The bibliometric analysis is performed to generate a statistical evaluation of published urban sprawl articles. Urban sprawl articles have been widely studied and published in contemporary high-impact journals. Three highly regarded, peer-reviewed databases were selected to highlight the trend of past urban sprawl studies from the year 2000 to 2019. Essential keywords were utilized in the search, such as 'urban growth', 'urban sprawl', 'urbanization', 'land use land cover', 'change detection', among others. These broad categories were narrowed further to those applied to urban sprawl studies such as 'urban sprawl theories', 'urban sprawl definition', 'driving forces', 'urban sprawl consequences', 'environmental change', 'measurement of sprawl', and so on. It is crucial to know the correct conjunctions i.e. AND, OR and NOT. After the initial exploratory searches to identify the publications, the study was then refined with a blanket search, to screen out book, book chapters, and reference work entries to leave only articles and conference papers. Afterward, the study was directed to investigate the continent the urban sprawl originated from. This was accomplished to comprehend the trend of urban sprawl studies within the global phenomenon of urban sprawl.

RESULTS

The first database used was Web of Science with 214 articles spanning from the year 2000 until 2019 (Table 1). In the first nine years from the Web of Science database, which included the year 2000 to 2008, only single-digit articles were published. The publications reached double-digits steadily after 2011 and the highest

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publication was recorded in 2019. The second database involved was SpringerLink with 992 articles ranged over the same period (Table 2). SpringerLink contained more published articles in their database and it happened to have more journals that provided additional platforms as well. Over the second decade, the publications fluctuated. In the second 10 years, the publications

steadily increased. The third database that was selected was ScienceDirect with 1,171 articles also from the year 2000 through 2019 (Table 3). In the first six years of the ScienceDirect database, fewer than 20 articles were published annually. After 2007, the publications increased with more than 100 articles published in 2015 and onwards.

Table 1 Urban sprawl articles in Web of Science Database from 2000 and 2019

2019	47	2014	14	2009	12	2004	2
2018	29	2013	11	2008	3	2003	1
2017	17	2012	12	2007	2	2002	0
2016	21	2011	12	2006	1	2001	1
2015	23	2010	5	2005	1	2000	0

Table 2 Urban sprawl articles in SpringerLink Database from 2000 and 2019

2019	160	2014	84	2009	24	2004	19
2018	100	2013	69	2008	39	2003	11
2017	70	2012	45	2007	29	2002	9
2016	112	2011	38	2006	23	2001	14
2015	89	2010	32	2005	18	2000	7

Table 3 Urban sprawl articles in ScienceDirect Database from 2000 and 2019

2019	177	2014	76	2009	52	2004	8
2018	158	2013	73	2008	35	2003	10
2017	132	2012	75	2007	27	2002	5
2016	113	2011	50	2006	24	2001	6
2015	110	2010	26	2005	12	2000	2

The second part of bibliometric analysis investigated the continent of origin of urban sprawl articles. Then the study was more closely focused to investigate three countries with large land masses – the USA, China and India. The USA was chosen because it runs the biggest scientific databases and it is also the world economic powerhouse. The earliest modern urban sprawl was found in the USA after World War II. China and India were chosen because they represent Asia, both have massive populations, and hence are expected to exhibit the greatest urban growth in the coming decades (Yehua and Ewing, 2016). The World Bank and the World Trade Organization have recognized China as the world’s second economic leader since 2010 (Zeng 2019) while India has experienced a tremendous economic growth rate (between 6% and 8% per annum) in the last decade (Mishra 2020).

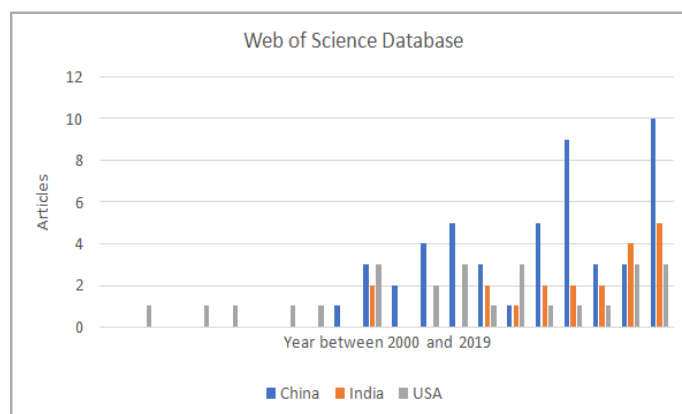


Figure 1b Urban sprawl articles published in Web of Science database from 2000 to 2019 by USA, China and India

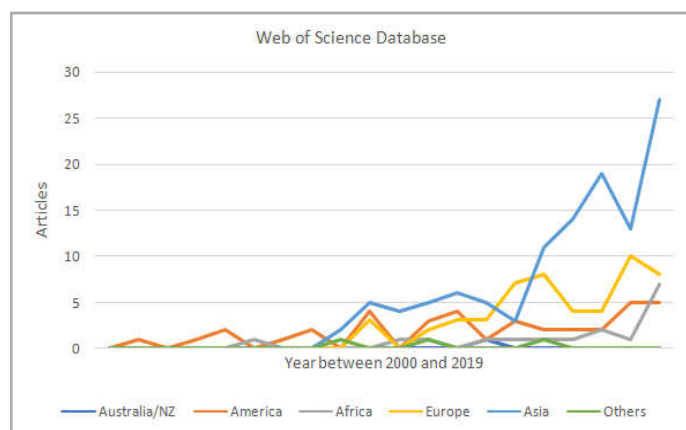


Figure 1a Urban sprawl articles published in Web of Science database from 2000 to 2019 according to continents

In the first quarter of the observation of the 20-year time frame, most of the urban sprawl articles published in the Web of Science database are from the American continent (Figure 1a). Articles published from Asia only commenced in 2008, and since 2009, Asian publications have comprised the highest number of included urban sprawl articles. Starting from 2009, articles published from America have been persistent but have not shown a significant increase. Articles published from Europe commenced in 2009 and have been increasing since. Figure 8.1b shows that the trend of urban sprawl articles originating from China has overtaken American publications since 2010.

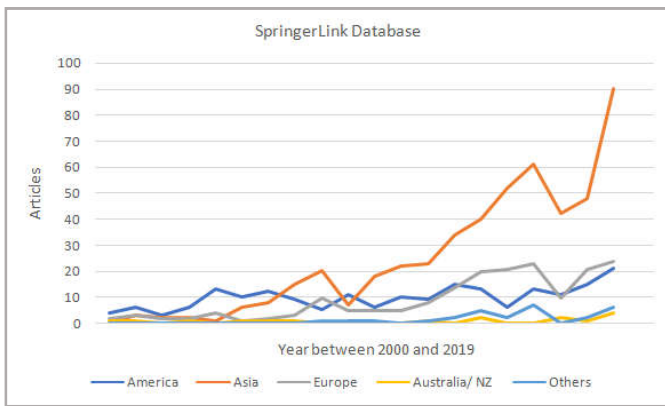


Figure 2a Urban sprawl articles published in SpringerLink database from 2000 to 2019 according to continents

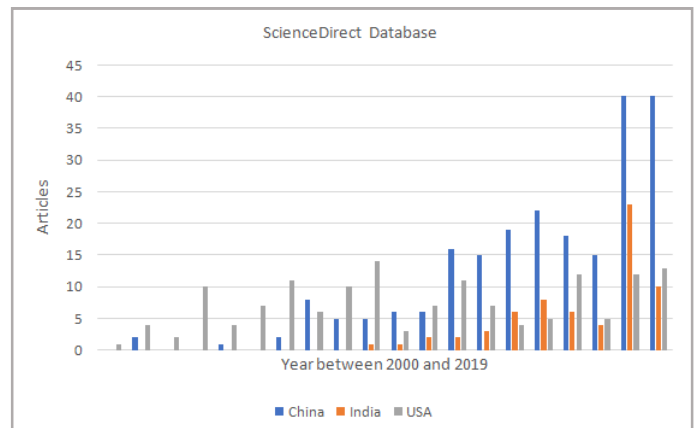


Figure 3b Urban sprawl articles published in ScienceDirect database from 2000 to 2019 by USA, China and India

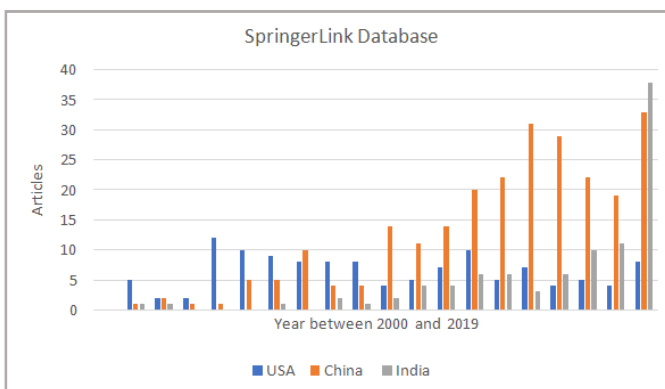


Figure 2b Urban sprawl articles published in SpringerLink database from 2000 to 2019 by USA, China and India

CONCLUSION

From all the databases, the general trend indicates an increase in publications of urban sprawl articles from Asia, primarily China and India, closely associated to the rapid economic of both countries growth in the last decade. Based on the evidence, it was concluded that actual urban phenomena influenced the articles published. As the world's second largest economy, China faces urban expansion at a tremendous rate with urban sprawl and environmental issues becoming more pronounced. Significant health effect have been identified in the Chinese population due to being subjected to decades of environmental degradation (Lu et al., 2017, Hao et al., 2018). India has also been experiencing rapid economic growth with several sectors performing very well such as the oil and gas, infrastructure, steel and service industries. This has stimulated rural to urban migration in many large Indian cities, thereby resulting in urban sprawl (Bhat et al., 2017, Sahana et al., 2018).

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In the first seven years, most of the urban sprawl articles published in the SpringerLink database originated from the American continent (Figure 2a). Articles published from Asia overtook their American counterpart by 2007. Overall, Asian articles have shown a noticeable increase in publication since then. American articles do however, continue to be published but the annual amount has not varied greatly. European publications have fluctuated in the first ten years but have since steadily increased over the second ten years. Figure 2b shows that articles from China dominated publications from 2010 until 2018, but was overtaken by articles from India in 2019. The publication trend in the ScienceDirect database is more interesting. The urban sprawl publication of almost all continents have exponentially increased (Figure 3a). Similar to the two previous databases, articles published from the American continent had dominated publications in the early years of observation. Since 2010, urban sprawl articles from Asia and Europe have overtaken articles from America. The trend is similar in Figure 3c where Chinese articles have surpassed the publication of articles by the USA.

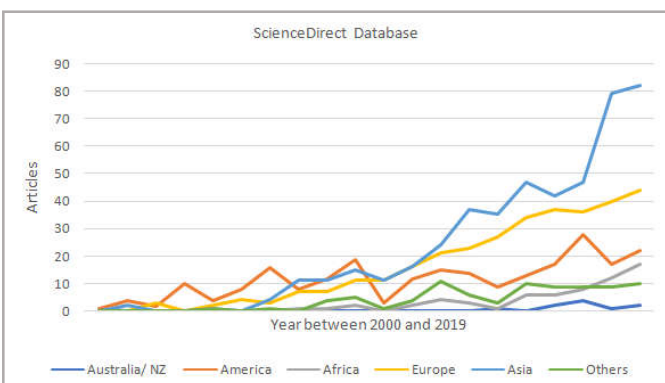


Figure 3a Urban sprawl articles published in ScienceDirect database from 2000 to 2019 according to continents

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