

Article

Sustainable Transport Infrastructure and Economic Returns: A Bibliometric and Visualization Analysis

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Received: 4 January 2020; Accepted: 20 February 2020; Published: 6 March 2020



Abstract: Sustainable transport infrastructure can determine the effect of countries' transport-driven economic returns. Considering the economic, environmental, and social relevance and growing issues of CO₂ in the countries concerned, this study aims to examine sustainable transport infrastructure related to economic return through a bibliometric and visualization analysis from 2000 to 2019. First, to measure the status of sustainable transport infrastructure literature, we determine the number of publications produced per year. Second, we determine the most frequently cited articles and prominent journals on sustainable transport infrastructure. Third, we examine the co-occurrence of the author's keywords below the abstract. Fifth, we describe the bibliometric details in clusters and analyze the network link between reference, sources, and authors' co-citations, and discuss the characteristics and structures of clusters. Sixth, we discuss the bibliographic relationship between authors, and finally, determine the country and the institutional network of co-authors. The obtained results identify that the most influential articles, journals, and authors that make a significant contribution to sustainable transport infrastructure studies and present the research sub-areas or themes related to sustainable transport infrastructure. Overall, the study found the paradigms of today, key research areas, and the link between the fields of sustainable transport infrastructure studies. In the meantime, this study also reveals the improvements in the main topics and sub-sections over the last 20 years and shows the changes in future areas of research. The study concluded that the findings could provide researchers with some insights and help to advance studies on sustainable transport systems.

Keywords: sustainable transport; infrastructure; bibliometric; visualization; economic growth

1. Introduction

Mobility and sustainability have become an integral part of transport policy and strategy in recent decades, as social interaction depends on the movement of people and goods and, overall, is a key human need [1]. In particular, due to the interdependence of transport influence and sustainability and the difficulties in managing sustainable transport, the literature requires detailed studies on the relevance of sustainability in transport infrastructure [2–4]. The strong relationship between sustainable transport and economic return, and in particular sustainability in transport infrastructure, mobility, highways, rail, walkways, tunnels, stations, airports and airways, waterways, pollution, conservation, and protection, are all clearly stated [5,6]. Although the idea comes mainly from a diverse range of sustainable development perspectives, the concept of sustainability is a new paradigm for transport infrastructure [6]. The emphasis of sustainability is on addressing today's needs without impacting future generations' capacity to address their needs. A sustainable transportation system in

the transport sector refers to one that is obtainable, secure, environment-friendly, and affordable [7]. According to Litman and Burwell [8], sustainability in transport is mainly measured by the economic, environmental, and climate efficiency and effectiveness of the transport system.

Transport infrastructure in particular is a dynamic network linking cities and people movements with socially, economically, and environmentally sound urbanization and population growth. Additionally, transport infrastructure networks contributed to socio-economic development and improved living standards throughout the generations during the urban advance of between- or within-city connections [9,10]. Transport infrastructure, on the other hand, contributes considerably to regional and national economic development [11]. Ultimately, highways, railways, paths, bridges and tunnels, roads, airports, and air routes, as well as waterways, are included in the transport infrastructures. Construction of the transport infrastructure is the essential sector of the domestic economy, supporting and guaranteeing economic and social development [12,13].

Furthermore, sustainability in transport infrastructure and circular economies, which rely on technological developments and efficient transport facilities, is also essential in order to protect the current theories from the global environmental challenges faced by people today [14,15]. Besides, sustainable investment in transport infrastructure on the multi-modal transport system (MTS) highlights cost-effectiveness, efficiency, protection and promptness, job creation, and the boosting of trade. As a result of multi-modal integration, sustainable investment in transport provides better links to products, inputs, and final goods so as to increase the production performance of the global supply chain. Better logistics and supply chains could open up access to previously inaccessible areas as well as connect key economic centers in a region with domestic markets [16,17]. Similarly, the sustainability of intercity transport services entails large amounts of investments, and has complex impacts on traditional aviation services [18,19]. Therefore, to ensure the sustainable growth of the transport networks of the country, we need to conserve resources, reduce energy use, protect the environment by creating economic transport and smooth transport and ensure multi-modal integration. In order to ensure continuous mobility based in particular on income, employment, and economic growth, it is essential to ensure sustainability in the transport infrastructure. Although the transport literature on related issues of sustainability has grown [8,14,15,20], very little is known about sustainability in transport infrastructure research.

Moreover, given the use of bibliometrics as a multidisciplinary tool for quantitatively analyzing bibliographic data using statistical and mathematical methods [21–23], several studies focused on the relation between sustainability and transport bibliometric analyses [6,24–31] and sustainability and transport infrastructure [32–35]; however, as far as our knowledge is concerned, no attempt has been made in the field of bibliometrics and visualization studies that considers sustainability in the transport infrastructure that is related to economic returns.

Thus, in this paper, we try to complete those gaps and to present a comprehensive bibliometric investigation of the trend towards sustainability in transport infrastructure related to economic returns, such as employment growth, income, and economic growth. The study applies bibliometric and visualization analysis toward transport infrastructure. We used the VOS visualization using the Web of Science (WoS) core collection database throughout 2000–17 December 2019. We used the co-occurrence of keywords under the abstract, co-citation, bibliographic, and co-author analysis. In particular, the results have shown the status of growth in the number of articles, authors, organizations, countries, and trends in impact, which provides valuable information for future researchers. In this regard, the paper adds to the sustainable transport-led economic literature, providing a comprehensive view of the economic impact of sustainable transport systems from the perspective of previous studies. The findings may not only help future researchers to decide on sustainable transport infrastructure development, but they also represent the need to develop a sound strategy to address the poor public policy outcomes of a more accessible country. In general, considering the case of sustainable transport infrastructure, the paper makes the following contributions:

1. We build on the state of knowledge of sustainable transport infrastructure at the theoretical level, which plays a key role in further studies;
2. We develop the central areas of research and the interrelationship between the fields involved in sustainable transport infrastructure studies.

This study is, therefore, aimed at addressing the following research questions: (1) what are the most important papers and journals that make the most significant contributions to the study of sustainable transport infrastructure? (2) Who are the most influential authors contributing the most to sustainable studies of transport infrastructure? (3) What are the sub-areas of research related to the sustainable transport infrastructure that make the most significant contribution to studies of sustainable transport infrastructure? To this end, we used bibliometric and visualization analysis toward sustainable transport infrastructure studies.

Section 2 provides data source information and analytical methods; the bibliometric and visual data analysis results are provided in Section 3, and Section 4 ultimately addresses the discussion and the main conclusions.

2. Materials and Methods

This chapter discusses the data sources used for the study. The WOS core database was used to gather the information published on literature-related sustainable transport infrastructure. The WoS core database is the source of data that contains many sub-databases. Recent bibliometric analyses were usually based on the WoS core database, which is the most widely accepted database [36,37]. We have concentrated on the WoS data, which include only the most prominent articles in previous studies with the highest standards.

We found all the documents using the keywords “sustainability” and “transport infrastructure” to evaluate sustainable infrastructure and, at the same time to focus on sustainable transport infrastructure related to income, employment, and economic growth. We used the key query (ST = sustainable* transport*; ST' = effect* or influence* or impact*; and ST'' = rail* or rail* or road*, or highway* or expressway* or highway*) to search in the WoS core collection; where * represents a blurry, and ST is a quest for an item. We have restricted our data to academic articles published in English between 2000 and 17 December 2019 following the terms of the queries. Data were collected on 17 December 2019. We found 90,501, 2997, and 77 documents that met our criteria for sustainability, sustainable transport, and sustainable transport infrastructure, respectively, and downloaded their metadata records.

Almost five decades ago, scientific methods for the research had been suggested by [38]. Bibliometric approaches (e.g., co-citations analysis and bibliographic coupling) employ journal database bibliographical data to create scientific field structural images. These incorporate a measure of objectivity in the review of scientific literature [39] and can be used to identify informal research networks, i.e., “invisible schools”, which exist under the surface but are not formally related [40]. Such groups share research interests and have underlying connections through personal communication, seminars, and summer schools that are invisible to outsiders. Citation images from the fields of research aggregated over time, and the views of the authors on subjects, methods, and the importance of other writers' works are taken into account [41]. There are two main uses in bibliometrics: performance analysis and scientific mapping [42]. The performance analysis aims to assess individuals' and institutions' research and publishing performance. Science mapping seeks to reveal the science field structure and dynamics. This research used bibliometric measurement methods that are the proper tools to interpret and represent the data used [43]. The study specifically used some of the most popular research indicators following this methodology for measuring productivity, with the number of papers and citations illustrating the impact of a country, institution, or author [43,44]; the number of papers above the threshold is used for measuring the effect of articles [44]; and the impact factor of the WoS estimation of the effect on journal dissemination is measured [45]. The work also focuses on the application of mathematical modeling to map the results graphically. The research employed the popular software VOS, a method used widely in the literature and particularly in bibliometrics [46].

This code shows authors, papers, universities, and countries with bibliometric map structures and networks. We analyzed keywords co-occurring below the abstract (i.e., if two articles are cited in the same article) [47], and bibliographic coupling and co-author [48]. These analyses were the most frequently used in the bibliometric literature. We, therefore, studied bibliometrics in this paper and added to the bibliographic interconnection a pertinent research subject from late bibliometric studies.

3. Results

In this article, to identify the most influential authors, publications, and journals that have highly contributed to the sustainable transport infrastructure of 2997 articles with 78,320 references; to define sub-fields that constitute a sustainable transport infrastructure field of study; to visually map the analytical structure over different periods; and to indicate changes in the research themes between 2000 and 2019, the analysis takes seven steps into account. First, the article examines the status of the sustainable transport literature, focusing on infrastructure and income growth, as well as paper citation structure. Second, it focuses on the most frequently cited papers on sustainable transport and the growth of infrastructures and employment. Third, we examine the prominent journals on these topics in general and specifically. Fourth, in sustainable transport, we look at the analysis of the co-occurrence of keywords of the author. Fifth, this article discusses co-citing sustainable transport sources journals and authors. Sixth, the bibliographic relation between authors is discussed. Finally, the paper also looks at the country and institutional network of co-authors.

3.1. Sustainability Status and Progress in the Literature on Transport Infrastructure

The regular articles related to sustainability, which were published and released on the WoS, significantly increased during the study period, particularly in the 2000s. More than 1000 publications have been published every year since 2000, and more than 10,000 publications since 2018 (see Figure 1).

This trend has been translated into sustainability and transportation literature and infrastructure-related sustainability works of literature. The number of papers relating to the sustainability sector in the year 2000 was 42, but in 2019 it grew to 322 annual papers; more than 100 papers have appeared since 2010, and over 200 papers have been published annually over the last five years. However, in 2019, only 3.8% of sustainability papers were related to transport infrastructure.

As far as sustainability in the transport infrastructures was concerned, only 0.09%, 0.05%, and 0.12% of sustainable transport infrastructure papers were related to economic returns in 2000, 2010, and 2019, respectively.

Table 1 shows the general structure of citations for sustainable transport infrastructure and sustainable transport infrastructure related to economic returns such as income, employment, or economic growth. In sustainable transport infrastructure, only 0.03% of the papers received over 250 citations, and 19.32% of the papers received ten or more citations. Furthermore, only 2.60% of the papers received more than 50 citations on sustainable transport infrastructure related to income, employment, or economic growth, and 28.57% of articles have more or equal to five citations.

Table 1. General structure of citations on sustainable transport and sustainable transport infrastructure.

Citations Number	Sustainable Transport			
	Articles No	Cumulative Number of Articles	% Articles	% of Cumulative Articles
more than or equal to 500	1	1	0.03	0.03
more than or equal to 250 and < 500	0	1	0.17	0.03
more than or equal to 100 and < 250	28	29	0.77	0.97
more than or equal to 50 and < 100	68	97	2.27	3.24
more than or equal to 25 and < 50	162	259	5.41	8.64
more than or equal to 10 and < 25	320	579	10.68	19.32
<10	2418	2997	80.68	100.00
Total	2997			

Table 1. Cont.

Sustainable Transport Related to Infrastructure Development				
Citations Number	Articles No	Cumulative Number of Articles	% Articles	% of Cumulative Articles
more than or equal to 50	2	2	2.60	2.60
more than or equal to 25 and < 50	3	5	3.90	6.49
more than or equal to 10 and < 25	6	11	7.79	14.29
more than or equal to 5 and < 10	11	22	14.29	28.57
<5	55	77	71.43	100.00
Total	77			

Source: own elaboration based on the WoS, 17 December 2019.

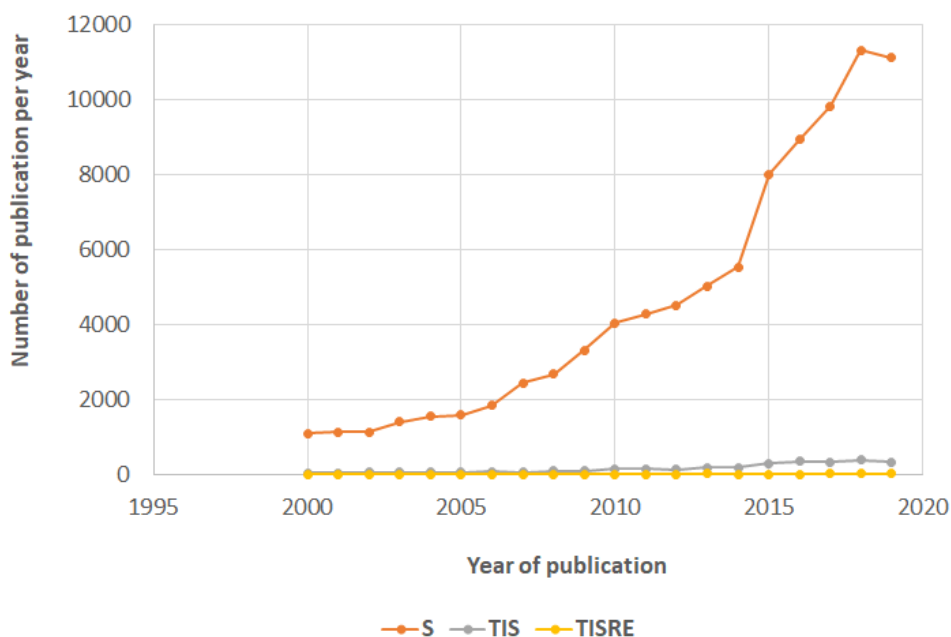


Figure 1. Annual publishing patterns in the Web of Science (WoS) in sustainability (S), transport infrastructure sustainability (TIS), and transport infrastructure sustainability related to economic returns (TISRE). The S, TIS, and TISRE lines show the number of publications per year in sustainability, transport infrastructure sustainability, and transport infrastructure sustainability related to economic returns, respectively.

3.2. The Most Cited Papers in Sustainable Transport Infrastructure and Sustainable Transport Infrastructure Related to Income, Employment Growth, or Economic Growth

The number of citations published in this area can also be evaluated in order to demonstrate the importance of the different documents. We focused on the analysis of transport infrastructure sustainability research and income, employment growth, or economic growth-related transport sustainability research. We ranked the top twenty papers with the most references in order to find the essential documents in the area of sustainable transport infrastructure, and the top ten papers with the most references regarding sustainable transport infrastructure related to income, employment growth, or economic growth. The analysis of the citation numbers shows the quality and influence of the document [49], and also the importance and effect of the research in the area of study [45].

Tables 2 and 3 reveal the 20 most widely cited articles in sustainable transport infrastructure and their characteristics. As one can observe from Tables 2 and 3, in the transport infrastructure sustainability, the most frequently cited paper is the one by Banister [50], with more than 674 citations in the WoS. This article is based firstly on traditional travel planning concepts as a result of the demand to reduce travel costs. It implies that the current paradigm must be more flexible, particularly in order to achieve a sustainable mobility agenda. Furthermore, the paper argues that policy measures are possible to enhance public transport efficiency and that the conditions required for reform are the main

challenges. According to this article, those conditions depend on the high level of implementation of innovative plans and on the need to build public confidence and public acceptability to promote these initiatives through active participation and actions. Additionally, in order to increase public acceptance, the key elements of sustainable mobility are outlined.

The second article most often cited is a paper by Holden and Norland [51], with over 220 WoS citations. The paper discusses the association between land usage, use of energy, and transport features. The study found that the small town is very supportive of a sustainable urban model.

In particular, Table 4 shows the most citations of the top ten articles in sustainable transport infrastructure related to economic returns and their characteristics. As one can observe from Table 4, in sustainable transport infrastructure related to economic returns, Rackwitz et al. [52] is the most cited paper in sustainable transport infrastructure related to income, employment growth, or economic growth, with 77 citations in WoS. The paper studies the socio-economic, technical, and financially sustainable civil engineering infrastructure. There is a discussion of the financial aspects. A design and maintenance strategy is to be selected where reconstruction or repair structures are systemically refurbished. An appropriate target role is established to determine the cost–benefit relationship based on the renewal model. There is a plan for an appropriate scheme of intergenerational discounts. Infrastructures also involve risks for human lives and reduce socio-economic acceptability criteria as a cost–benefit analysis guideline, and finally, different regeneration models for aging systems are explored, including multiple modes of failure. The paper contains several examples that illustrate the theory developed.

Further, the second most cited paper in sustainable transport infrastructure related to income, employment growth, or economic growth is the paper by Offer et al. [53], with 55 citations in WoS. The article presents the development and economic research into the future viability of electric cable hydrogen, battery-electric, and hybrid-fuel gas cell plug-ins in the UK's road transport network. The study provides an overview of private car users' average distance data in the UK. The results indicate that the economic return on plug-in hybrid electric vehicles (PHEVs) with battery dimensions higher than 20 kWh will decrease.

Table 2. Top 20 articles with the maximum citations in sustainable transport infrastructure.

R	Journal	TC	CY	Article	Authors	Year
1	TRANSPORT POLICY	674	56.17	The sustainable mobility paradigm	Banister D	2008
2	URBAN STUDIES	220	14.67	Three obstacles as a sustainable town for the compact city: energy consumption and transport for households in eight residential regions in Greater Oslo.	Holden E, Norland IT	2005
3	NATURE	218	1.14	Using membranes to improve crops in order to produce sustainable food	Schroeder JI, Delhaize E, Frommer WB, Guerinot ML, Harrison MJ, et al.	2013
4	ENERGY POLICY	214	21.4	Comparative analysis in a possible sustainable road transport network with battery, hydrogen fuel, and hybrid vehicles	Offer GJ, Howey D, Contestabile M, Clague R, Brandon NP	2010
5	ENERGY ENVIRONMENTAL SCIENCE	213	21.3	Sustainable transport based on principles for electric vehicles: short description	Eberle U, von Helmolt R	2010
6	GENDER PLACE AND CULTURE	204	20.4	Sex and mobility: new approaches to sustainable knowledge	Hanson S	2010
7	JOURNAL OF INFRASTRUCTURE SYSTEMS	174	11.6	Sustainability addresses in transport systems: definitions, measures, and metrics	Jeon CM, Amekudzi A	2005
8	ACCIDENT ANALYSIS AND PREVENTION	168	15.27	The non-linear risk and sustainable transport promotion	Elvik R	2009
9	ENVIRONMENT AND URBANIZATION	163	11.64	The Eco-City: 10 vital transportation and urban planning dimensions	Kenworthy JR	2006
10	TRANSPORT POLICY	160	10.67	Sustainable accessibility: a conceptual structure to incorporate the strategy for transportation and land use. Two experiments in the Netherlands and a report on the future	Bertolini L, le Clercq F, Kapoen L	2005

Source: own elaboration based on the WoS, 17 December 2019. R: ranking; TC: total citations; CY: citations per year.

Table 3. Table 2 continued: top 20 articles with the maximum citations in sustainable transport infrastructure.

R	Journal	TC	CY	Article	Authors	Year
11	HABITAT INTERNATIONAL	149	14.9	Sustainable urban growth and rising transport: urban expansion implications for mobility in Beijing's urban borders	Zhao PJ	2010
12	BUILDING AND ENVIRONMENT	143	11	The South African construction industry's viewpoint is one of the key performance metrics and sustainability evaluation methods	Ugwu OO, Haupt TC	2007
13	PROCEEDINGS OF THE NATIONAL ACADEMY OF THE USA	141	10.85	Sustainable fuel in the transport sector	Agrawal R, Singh NR, Ribeiro FH, Delgass WN	2007
14	CANADIAN JOURNAL OF CIVIL ENGINEERING	139	9.27	Developing standards for sustainability in urban infrastructure networks	Sahely HR, Kennedy CA, Adams BJ	2005
15	RESEARCH POLICY	138	10.62	How are clusters of technology emerging and sustainable? San Diego Biotechnology Cluster Social networking and inter-company mobility	Casper S	2007
16	JOURNAL OF INFRASTRUCTURE SYSTEMS	124	20.67	Resilience and Sustainability of Civil Infrastructure: A United Approach	Bocchini P, Frangopol DM, Ummerhofer T, Zinke T	2014
17	RENEWABLE SUSTAINABLE ENERGY REVIEWS	123	24.6	Hydrogen: sustainable fuel for the future of the transportation sector	Singh S, Jain S, Venkateswaran PS, Tiwari AK, Nouni MR, et al.	2015
18	ECOLOGICAL INDICATORS	122	12.2	Methodology for identifying sustainability indicators in the management of construction projects-Application for infrastructure projects in Spain	Fernandez-Sanchez G, Rodriguez-Lopez F	2010
19	ENERGY CONVERSION AND MANAGEMENT	119	14.88	Sustainability assessment of electric vehicles as a system of personal mobility	Faria R, Moura P, Delgado J, de Ailmeida AT	2012
20	PUBLIC ADMINISTRATION REVIEW	116	10.55	Public-private Urban Infrastructure Partnerships: Investment and Sustainability of the Private Sector	Koppenjan JFM, Enserink B	2009

Source: own elaboration based on the WoS, 17 December 2019. R: ranking; TC: total citations; CY: citations per year.

Table 4. Top 10 most cited articles in sustainable transport infrastructure related economic returns.

R	Journal	TC	CY	Article	Authors	Year
1	STRUCTURAL SAFETY	77	5.13	Sustainable socio-economic civil engineering infrastructures by optimization	Rackwitz R, Lentz A, Faber M	2005
2	ENERGY POLICY	55	6.11	Techno-economic and Behavioral research in the future safe road transport network in the U.K. hydrogen fuel cell and hybrid vehicles	Offer GJ, Contestabile M, Howey DA, Clague R, Brandon NP	2011
3	APPLIED ENERGY	41	5.13	a multi-target optimization model for sustainable energy generation and CO ₂ mitigation (EGCM) infrastructure design, taking economic and financial risk into account	Han JH, Ahn YC, Lee IB	2012
4	ENERGY POLICY	31	4.43	Electric vehicle choice for an environmentally and economically sustainable transport system.	Tseng HK, Wu JS, Liu XS	2013
5	URBAN PLANNING AND DEVELOPMENT JOURNAL – ASCE	26	1.86	Transport system Sustainability challenges in small, medium or low-income economies: Case studies in Georgia, South Korea, Honduras, and Ghana.	Jeon CM, Amekudzi AA, Vanegas J	2006
6	RESOURCES CONSERVATION AND RECYCLING	19	1.73	Developing and evaluating strategies to ensure the economic sustainability of the US automotive recovery infrastructure	Kumar V, Sutherland JW	2009
7	TRANSPORT REVIEWS	15	1	Assessment of economic viability in sustainable transportation scenarios with an ESCOT history	Schade B, Schade W	2005
8	ECOLOGICAL ECONOMICS	14	1	Towards sustainable consumption: Economic modeling of mobility and heating for Austria	Kletzan D, Koppl A, Kratena K, Schleicher S, Wuger M	2006
9	TRANSPORTATION RESEARCH RECORD	14	1.56	Quantification of the economic sector of sustainable transport	Zheng J, Atkinson-Palombo C, McCahill C, O'Hara R, Garrick NW	2011
10	INTERNATIONAL JOURNAL OF ECOLOGY AND DEVELOPMENT	12	2.4	An ecological and economic evaluation of the transport system operating in the territory	Lyulyov O, Chortok Y, Pimonenko T, Borovik O	2015

Source: own elaboration based on the WoS, 17 December 2019. R: ranking; TC: total citations; CY: citations per year.

3.3. Prominent Journals in Sustainable Transport and Sustainable Transport Infrastructure

Of a total of 2997 and 77 articles on sustainable transport infrastructure and sustainable transport infrastructure-related to economic returns, respectively, 757 and 64 articles have been respectively published. Table 5 presents the leading journals with publications on sustainable transport infrastructure. Of the top five journals of several papers on sustainable transport infrastructure, the leading journals are Sustainability with 5.2% of the cumulative publications, the Journal of Cleaner Production with 2.4% of the cumulative publications, the International Journal of Sustainable Transport with 2.1% of the cumulative publications, and the Journal of Transport Geography with 1.7% of the cumulative publications.

Moreover, Transport Policy, with 1788 global citations, and the Journal of Cleaner Production, with 1086 global citations, sourced with as many global citations in the top 20 journals as possible per article published in Sustainable Transport Infrastructure. Furthermore, Table 6 presents the top journals with papers on sustainable transport infrastructure related to economic returns. As one can observe from Table 6, the top journals are Sustainability with 10.4% of total publications, Applied Energy with 3.9% of the total publications, Energy Policy, International Journal of Ecology & Development, and Transport Policy with 2.6% of the total publications.

Further, Energy Policy with 86 global citations, Structural Safety with 77 global citations, and Applied Energy with 43 global citations were sourced with the maximum number of global citations per journal published on sustainable transport infrastructure related to economic returns from the top 11 journals in several publications.

Table 5. Top journals with publications on sustainable transport infrastructure.

R	Journal	Recs	Percent	LCS	LCS/t	GCS	GCS/t	LCR
1	SUSTAINABILITY	155	5.2	22	3.99	579	218.17	343
2	JOURNAL OF CLEANER PRODUCTION	72	2.4	101	29.09	1086	309.45	170
3	INTERNATIONAL JOURNAL OF SUSTAINABLE TRANSPORTATION	62	2.1	90	15.35	698	112.76	93
4	JOURNAL OF TRANSPORT GEOGRAPHY	52	1.7	83	13.35	631	94.60	27
5	TRANSPORT POLICY	49	1.6	296	33.68	1788	204.5	79
6	TRANSPORTATION RESEARCH RECORD	42	1.4	106	11.31	362	40.13	55
7	TRANSPORTATION RESEARCH PART D-TRANSPORT AND ENVIRONMENT	31	1	92	13.04	526	83.08	71
8	TRANSPORT REVIEWS	31	1	77	7.82	478	52.09	20
9	RENEWABLE and SUSTAINABLE ENERGY REVIEWS	27	0.9	19	5.24	580	127.2	30
10	JOURNAL OF SUSTAINABLE TOURISM	22	0.7	37	5.80	376	66.10	34
11	TRANSPORTATION RESEARCH PART A: POLICY AND PRACTICE	19	0.6	93	13.62	425	62.41	45
12	ENERGY POLICY	17	0.6	37	3.71	712	83.43	12
13	JOURNAL OF URBAN PLANNING AND DEVELOPMENT	16	0.5	45	2.88	284	33.56	22
14	ECOLOGICAL INDICATORS	13	0.4	142	22.10	463	73.9	63
15	CITIES	13	0.4	31	6.97	263	54.07	20
16	JOURNAL OF INFRASTRUCTURE SYSTEMS	11	0.4	79	5.34	368	45.06	18
17	URBAN STUDIES	11	0.4	12	1.18	302	26.93	6
18	INTERNATIONAL JOURNAL OF HYDROGEN ENERGY	11	0.4	8	0.99	298	40.23	4
19	SUSTAINABILITY	155	5.2	22	3.99	579	218.1	343
20	JOURNAL OF CLEANER PRODUCTION	72	2.4	101	29.09	1086	309.4	170

Source: own elaboration based on the WoS, 17 December 2019. R: ranking; Recs: records; LCS: Local Citations score; LCS/t: Local Citation Score per year; GCS: Global Citation Score; GCS/t: Global Citation Score per year; LCR: Local Cited Reference.

Table 6. The top journals with sustainable transport infrastructure related to economic return publications.

R	Journal	Recs	Percent	LCS	LCS/t	GCS	GCS/t	LCR
1	SUSTAINABILITY	8	10.4	0	0	23	9.8	1
2	APPLIED ENERGY	3	3.9	1	0.5	43	6.13	0
3	ENERGY POLICY	2	2.6	1	0.11	86	10.54	1
4	INTERNATIONAL JOURNAL OF ECOLOGY and DEVELOPMENT	2	2.6	1	0.2	14	3.07	0
5	TRANSPORT POLICY	2	2.6	0	0	11	2.83	0
6	STRUCTURAL SAFETY	1	1.3	0	0	77	5.13	0
7	URBAN PLANNING AND DEVELOPMENT JOURNAL-ASCE	1	1.3	0	0	26	1.86	0
8	RESOURCES CONSERVATION AND RECYCLING	1	1.3	0	0	19	1.73	0
9	TRANSPORT REVIEWS	1	1.3	0	0	15	1	0
10	ECOLOGICAL ECONOMICS	1	1.3	0	0	14	1	0
11	TRANSPORTATION RESEARCH RECORD	1	1.3	0	0	14	1.56	0

Source: own elaboration based on the WoS, 17 December 2019. R: ranking; Recs: records; LCS: Local Citations score; LCS/t: Local Citation Score per year; GCS: Global Citation Score; GCS/t: Global Citation Score per year; LCR: Local Cited Reference.

3.4. Analysis of Keywords

This research analyzed the distribution of co-occurrent keywords of the most common keywords. In the study, the economic return-related sustainable transport infrastructure is minimal; we focus on the keywords below the abstract and illustrate the most important research topics in the sustainable transport sector. This method includes the number of papers in which the keywords outlined in each paper are combined.

The keywords and node sizes are shown in Figure 2. The VOS viewer software confirmed the presence of 5842 keywords in 2997 publications on sustainable transport networks. The higher the keyword and node, the larger the number of articles shown in the keyword. The thicker lines are more commonly associated with co-existence. The narrower the difference between nodes, the higher the association between these keywords and other keywords, and the more papers they compare. Nodes and keywords are coded to show that they belong to a group of seven clusters. The threshold of 10 occurrences, reflecting the 83 most common keywords, is shown in Figure 2.

The first cluster is the red one, containing 18 keywords; sustainable transport is a keyword leading the red cluster. The second cluster is the green one, containing 18 keywords; a keyword leading the green cluster is sustainability. The blue one is the third cluster, containing 17 keywords; sustainable mobility is a keyword leading the blue cluster. The fourth cluster is the yellow one, containing 14 keywords; infrastructure is a keyword leading the yellow cluster. The fifth cluster is the pink one, containing eight keywords; urban mobility is a keyword leading the pink cluster. The sixth cluster is the light blue one, containing six keywords; mobility is a keyword leading the light blue cluster. Finally, the final cluster is the orange one, containing two keywords; transport is a keyword leading the orange cluster. The top 30 co-occurrence keywords and total relation strength of the publications on sustainable infrastructure are seen in Table 7.

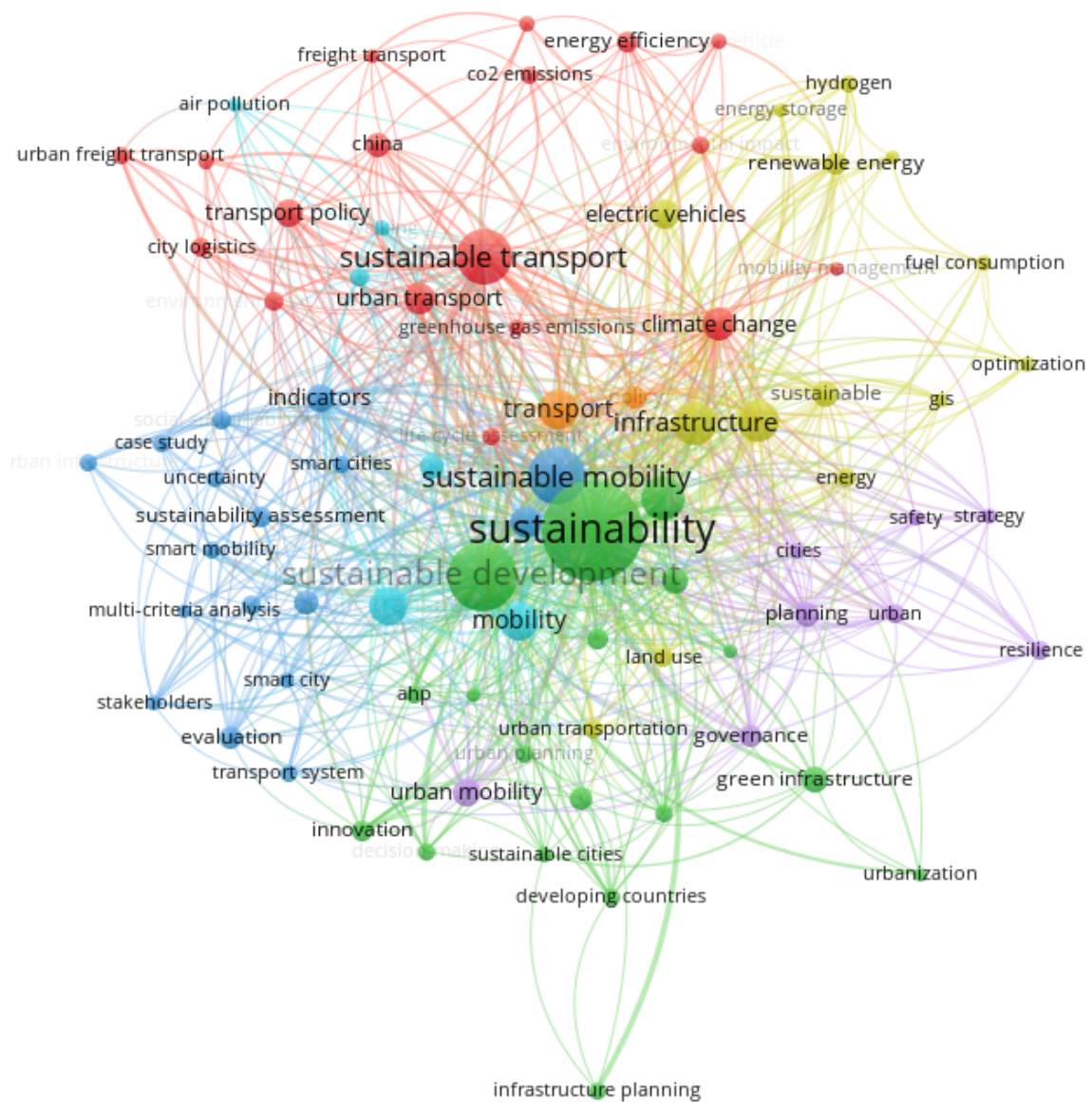


Figure 2. The author’s keyword co-occurrence network for the publications relevant to a sustainable network for transport. The statistic takes into account the threshold of 10 occurrences and indicates the most common 83 keywords out of the 5842 keywords.

Table 7. The top 30 author keywords co-occurrence of sustainable transport infrastructure publications and total link strength.

Keywords	Occurrences	Rank	Total Link Strength	Rank
sustainability	425	1	403	1
sustainable development	207	2	199	2
sustainable mobility	139	3	109	4
sustainable transport	132	4	130	3
sustainable transportation	83	5	47	15
infrastructure	78	6	109	4
transportation	75	7	107	6
transport	69	8	106	7
mobility	64	9	85	8
public transport	63	10	79	9
climate change	45	11	77	10
urban transport	43	12	56	12

Table 7. Cont.

Keywords	Occurrences	Rank	Total Link Strength	Rank
environment	42	13	54	13
electric vehicles	38	14	36	22
transport policy	35	15	41	17
urban mobility	34	16	39	18
indicators	32	17	70	11
sustainable	31	18	37	20
green infrastructure	29	19	23	34
transport planning	29	19	35	23
planning	27	21	54	13
accessibility	25	22	27	28
China	25	22	26	32
sustainable urban mobility	25	22	14	61
governance	24	25	37	20
policy	24	25	43	16
renewable energy	23	27	34	25
evaluation	22	28	27	28
sustainable infrastructure	22	28	10	78
energy efficiency	20	30	18	46

Source:own elaboration based on the WoS, 17 December 2019.

3.5. Reference, Journal, and the Author Co-Citation Analysis

Co-citation versus cited references, journals, and co-citation by authors are used in this section. The analytical co-citation explores the summary of two elements of paper, journal, or author in a third citation document (which appear jointly in other documents' reference lists). It divides the bibliometric details into clusters that allow network connection analysis, characteristics, and structures. First, we continue the co-citation network of references. The nodes show the relations between the various documents in this study and highlight the research problems that are strongly associated with the field of research. The cluster analysis shown in Figure 3 contains 2997 documents relating to sustainable transportation infrastructure arranged into four clusters. The first cluster is the red one, containing 19 items. Out of 19 items, the most cited paper in the red cluster and overall ranking is the one by Banister [50], with 141 citations and 266 total link strengths. Jeon et al. [54] led the second green cluster having 19 items, and, overall, was the second-ranking article with 74 citations and 215 total link strengths. Litman and Burwell [8], the third most frequently cited paper with 63 citations and 192 total link strengths, is also the second leading in the green cluster. Haghshenas [55] is the fourth-most frequently cited with 54 citations and 188 total link strengths, and also the third leading the green cluster. The report by the World Commission on Environment and Development [56] leads the third blue cluster containing seven items and is overall the fourth most frequently cited paper with 54 citations and 70 total link strengths.

Secondly, the co-citation investigation of sustainable transport is analyzed, considering the source of the network of co-citation (see Figure 4). The size and activity of a node represent the number of papers published in this analysis, and a short distance between two articles indicates a higher citation frequency. Figure 4 shows the existence of five significant clusters. The first cluster is the red one, containing 43 items (journals). The Journal of Cleaner Production leads the red cluster; it is the fourth regarding overall cited papers (1099) and highest link strength (24,934); the Ecological Economics Journal is the second leading the red cluster; it is the fourteenth regarding overall cited papers (371) and highest link strength (8346); the Landscape Urban Planning Journal is the third leading the red cluster; it is the sixteenth regarding overall most cited papers (341) and highest link strength (6294); the Ecological Indicators Journal is the fourth leading the red cluster; it is the twenty-first regarding overall cited papers (308) and highest link strength (7507); and the Environmental Impact Assessment Review Journal is the fifth leading the red cluster; it is the twenty-fourth regarding overall most cited

papers (282) and highest link strength (7234). The papers in this cluster focus primarily on examining sustainable public transport and mobility, and on formulating a conceptual framework of connections between urban green space and environment and human health.

Moreover, the second cluster is the green one, containing 30 items. the Transport Research Journal Part D: Transport and Environment leads the second cluster in green; it is the fifth regarding overall cited papers (877) and link strength (24,878). The Transportation Research Record Journal is the second leading in the green cluster; it is the seventh regarding overall cited papers (806 citations) and total link strength (17,937). The third leading journal of the green cluster is the Thesis, in the 8th place with a total of 543 citations and 7707 cumulative strength. The fourth leading journal of the green cluster is Sustainability; it is in the eleventh place, with overall 493 citations and 11,523 total link strength. Finally, the fifth leading journal of the green cluster is the European Journal of Operation Research; it is in the twelfth place with overall 493 citations and a total link strength of 11,523. Journals within this group focus mainly on the methodological framework for sustainable and comprehensive indicators of transport.

Furthermore, in the third blue cluster with 26 items, the Journal of Transport Geography is the first; it is in second place, with overall 1206 citations and 26,980 total link strength. The Journal of Environment and Planning is the second leading the blue cluster; it is in the twenty-second place with overall 287 citations and 6161 total link strength. The Journal of Urban Studies is the third leading the blue cluster; it is in the twenty-third place with overall 284 citations and 5765 total link strength. The Journal of the American Planning Association is the fourth leading the blue cluster; it is in the twenty-sixth place with overall 270 citations and 6472 total link strength. Finally, the Journal of Cities is the fifth leading the blue cluster; it is in the twenty-seventh place with overall 266 citations and 6719 total link strength. Journals within this group mainly focus on frameworks for sustainable transport research, new mobility paradigms, sustainable and high-quality transport, and transport and climate change.

Furthermore, the fourth cluster is the yellow one. Out of the 24 items in this cluster, Transport Policy is the leading journal in the yellow cluster; it is in the first place with overall 1327 citations and 27,586 total link strength. The Transportation Research, part A, Journal is the second leading the yellow cluster; it is in the third place with overall 1166 citations and 28,580 total link strength. The Transport Review Journal is the third leading the yellow cluster; it is in the tenth place with overall 535 citations and 12,255 total link strength. The Transportation Journal is the fourth leading the yellow cluster; it is in the thirteenth place with overall 415 citations and 9768 total link strength. The International Journal of Sustainable Transportation is the fifth leading the yellow cluster; it is in the eighteenth place with overall 325 citations and 8101 total link strength. Journals within this category focus primarily on the sustainable mobility framework and mobility indicators.

Finally, the fifth cluster is the pink one. Out of the 14 items in this cluster, Energy Policy is the leading journal in the pink cluster; it is in the sixth place with overall 831 citations and 19,654 total link strength. The Renewable and Sustainable Energy Reviews Journal is the second leading the pink cluster; it is in the ninth place with overall 535 citations and 16,509 total link strength. The International Journal of Hydrogen Energy is the third leading the pink cluster; it is in the fifteenth place with overall 359 citations and 5657 total link strength. The Energy Journal is the fourth leading the pink cluster; it is in the seventeenth place with overall 338 citations and 11,235 total link strength. Finally, the Journal of Applied Energy is the fifth leading the pink cluster; it is in the eighteenth place with overall 310 citations and 9306 total link strength. The journals within this cluster mainly focus on analyzing energy and sustainable transportation.

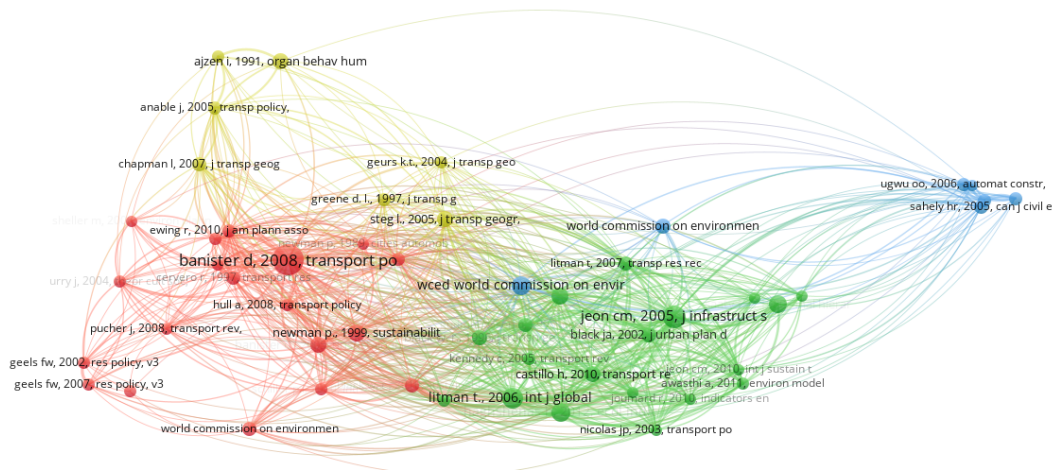


Figure 3. Co-citation of the cited sustainable transport references: 52 references of the 78,639 cited, which meet the minimum number of references of the 20 cited reference level.

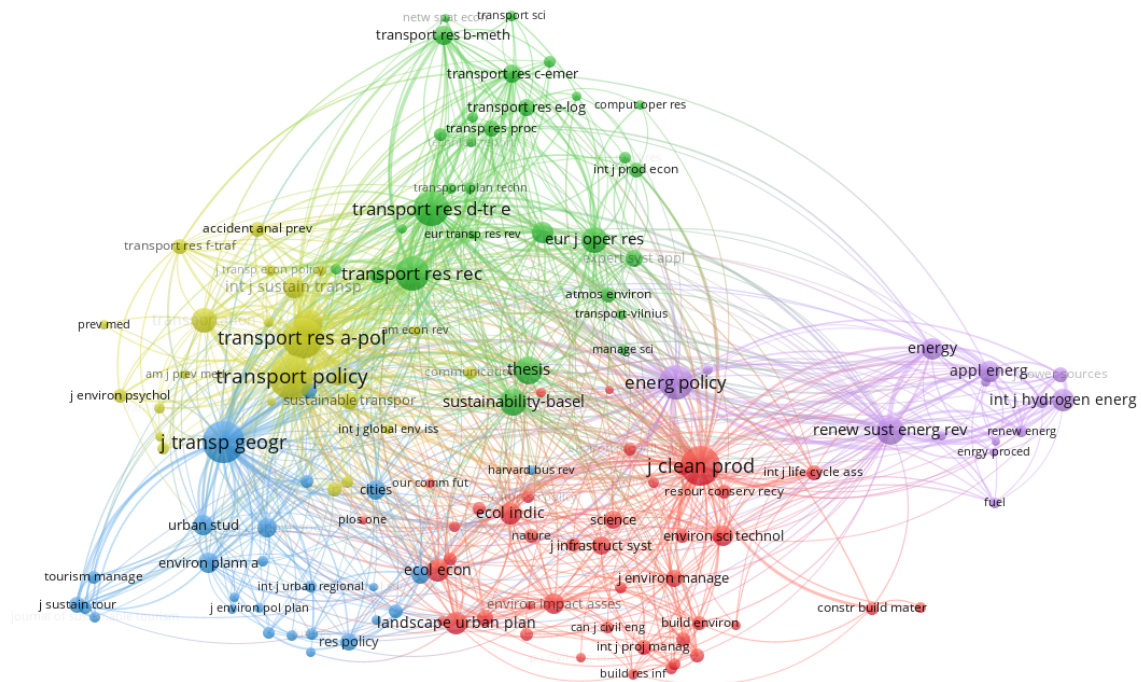


Figure 4. Co-citation versus Journal link on sustainable transport: 137 significant journals from the 40,467 cited sources meeting the minimum threshold of 60 citations of the source above.

Thirdly, the co-citation analysis of sustainable transport is analyzed considering the cited authors' co-citation network (see Figure 5). One can observe the existence of five clusters with 57 items from Figure 5. The first cluster is a red one containing twenty-one authors and led by Litman and Burwell [8]; the authors are the third with overall 325 citations and second with overall 1831 total link strength. Saaty [57] is the second leading author in the red cluster; the author is the seventh with overall 143 citations and twenty-first with overall 568 total link strength. Jeon [54] is the third leading author in the red cluster; the author is the eighth with overall 138 citations and seventh with 886 total link strength. The main focus of the articles in this category was a methodological framework for the identification, selection, and management of sustainable transport indicators, including definitions, indicators, and metrics. Individually, Litman and Burwell are working to identify and select sustainable transport indicators; Saaty is focusing on the method of decision-making support, and finally, Jeon focuses on approaching sustainable transport system sustainability: definitions, indicators, and metrics.

The second cluster is the green one with thirteen authors. Geels and Schot [58] are leading the second cluster; the authors are the sixth with overall 150 citations and eighth with the 863 total link strength. Steg [59] is the second leading in the green cluster; the author is the sixteenth with overall 115 citations and eighth with 606 total link strength. The main focus of the articles in this category was the evaluation of socio-technical transition pathways and the study of different motives for automotive use. Geels and Schot focus on the typology evaluation of socio-technical pathways. Steg and Gifford explore various reasons for the use of cars.

The third cluster is the blue one with ten items. The European Commission [60] leads the blue cluster; it also leads the overall clusters with 409 citations and 1050 total link strength. Black [61] is the second leading in the blue cluster; the author is thirteenth with overall 123 citations and a total link strength of 801. The main focus of the papers in this group is on developing sustainable solutions for the use and transportation of land. In particular, the European Commission (2003) focuses on developing sustainability strategies in land use and transport, and Black (2002) focuses mainly on performance indicators for sustainable urban transport.

The central and the fourth cluster is the yellow one containing ten items. Banister [50] is the leading author in the yellow cluster, and is also the second overall leading author with 403 citations and the first with a total 2590 link strength. Cervero [62] is the second leading author in the yellow cluster; the author is the fourth in overall 187 citations and third in a total of 1212 link strength. Pucher [63] is the third leading author in the yellow cluster; the author is tenth with overall 133 citations and twelfth with a total of 733 link strength. Newman [64] is the fourth leading author in the yellow cluster; the author is the eleventh with overall 126 citations and a total of 738 link strength. The authors of this cluster mainly focus on analyzing travel demand, cities, and transportation.

Finally, the fifth cluster is the pink one containing three items. May [65] leads the pink cluster; the author is the 15th with overall 118 citations and 661 total link strength. The cluster focuses mainly on urban transport policy and the challenge of meeting climate change goals.

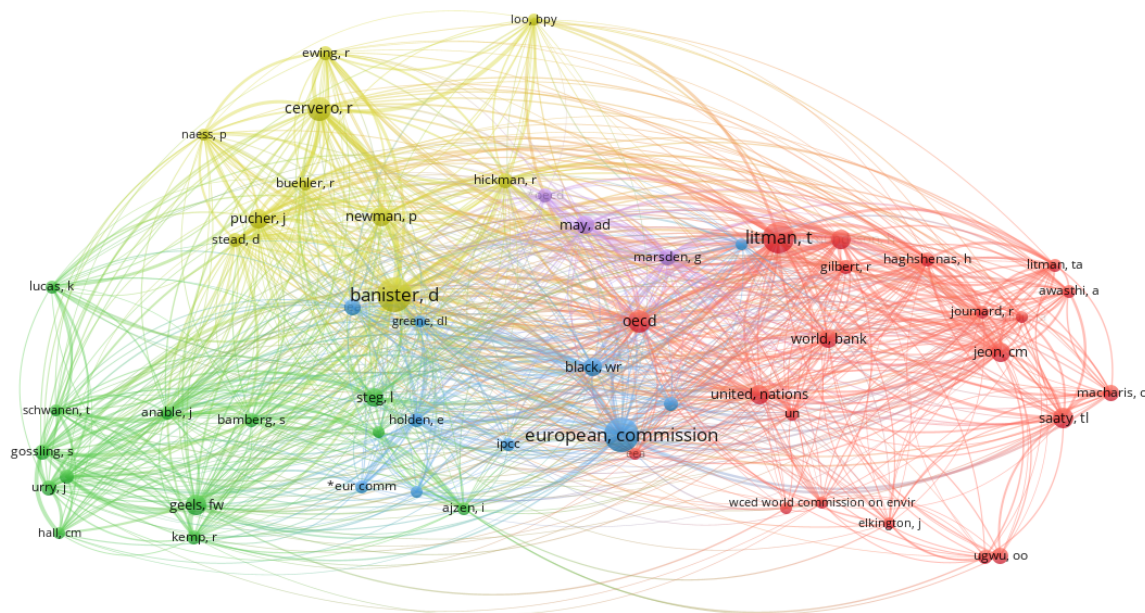


Figure 5. Co-citation versus author's linkage on sustainable transport: 57 of the 49,507 authors cited meet the criteria for at least 50 citations.

3.6. Bibliographical Coupling of Authors

Another way to look at the level of resemblance between a topic and the research, in this instance, is the analysis of bibliographical coupling. In the literature, bibliographic pairing used to supplement the study of co-citation, offering a different viewpoint of a topic or the relationship between authors.

If two articles appear in the other documents' reference list, the bibliographic links count the number of references specific to a couple of papers (A and B, both citing C). Figure 6 shows the findings of the bibliographic coupling of the authors described in six key clusters. The first cluster is the red one containing twenty-one items, with Gossling (975 link strength, 13 documents) leading the red cluster. Holden (597 link strength, five papers) is seventh in link strength and led the red cluster. Victor (1634 link strength, seven documents) is first in link strength and also leads the green cluster. Eugenio (1598 link strength, six documents) is second in link strength and also the second leading the green cluster. Sierra (1598 link strength, six documents) is second in link strength and also the second leading the green cluster. In the third blue cluster containing 5 items, Norbert (163 link strength and five documents) is twentieth in the overall in link strength and leads the blue cluster. In the fourth yellow cluster containing five items, Zhang (301 total link strength and six documents) is thirteenth in the link strength and leads the yellow cluster. The fifth cluster is the pink one containing three items. Bucher (970 link strength and five documents) is fourth in the link strength and leads the pink cluster; finally, the sixth cluster is the emerald green cluster containing two items, of which Makarova (125 link strength and five documents) is twenty-ninth in link strength and leads the emerald green cluster.

Moreover, there are three new approaches to analyzing sustainable transport infrastructure issues. The main one led by Victor, from Madrid's Polytechnic University, analyzes the positive contribution of the infrastructure to developing an economically active transport policy. From Harvard University and the Swiss Federal Institute of Technology, Dominik and Martin, respectively, concentrate on sustainable mobility; finally, Holden and Banister, from the Norwegian Life Sciences University and London University College, respectively, focus mainly on transport and sustainable development.

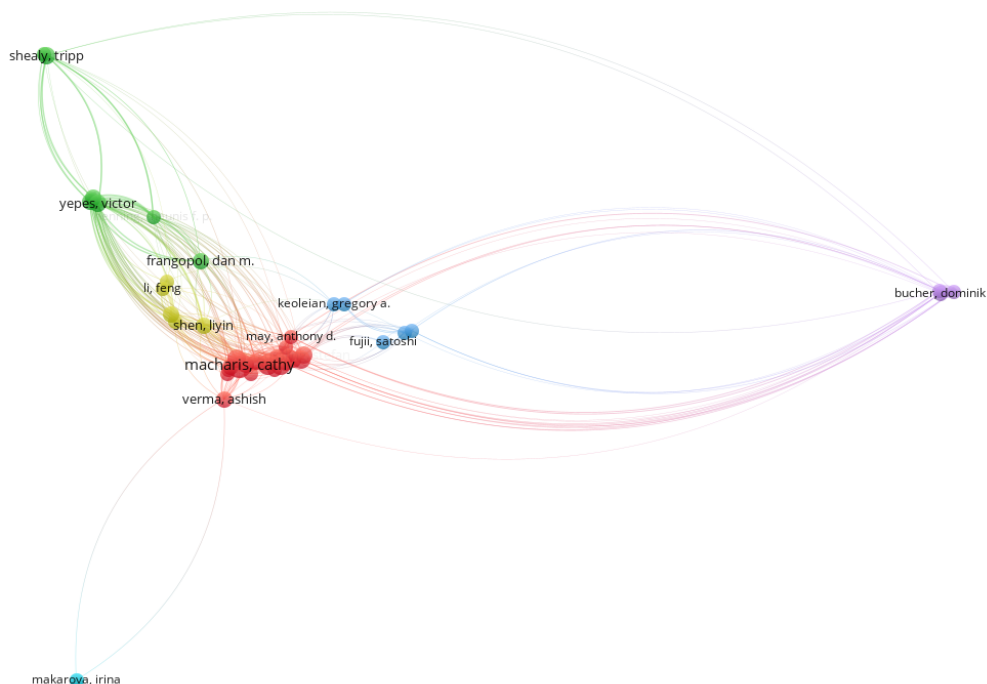


Figure 6. Author bibliographic coupling: 43 of the 7241 authors who comply with the minimum document number of a 5 per author.

3.7. Co-Author Analysis of Countries and Universities

Finally, the so-called co-authorship study was highlighted by bibliometric literature. This study helps to recognize the role of research network collaboration in a particular field. The nodes of this study show the institutions of the prominent countries, whereas the thickness and distance among them show a level of collaborative work. The VOS Viewer Software shows the document distribution (see Figure 7). Figure 7 displays the findings of the bibliographic coupling of the countries described

in eight key clusters. The top ten countries of interest are the USA with 568 documents, 5365 citations, and 39,384 total link strength; England is third, second, and second with 267 documents, 4397 citations, and 29,906 total link strength, respectively. The People's Republic of China is second, third, and third with 287 documents, 1887 citations, and 20,395 total link strength, respectively. Italy is fourth, ninth, and tenth with 182 documents, 937 citations, and 13,972 total link strength, respectively. Germany is fifth, seventh, and fifth with 167 documents, 1473 citations, and 16,390 total link strength, respectively. Australia is sixth, sixth, and seventh with 139 documents, 1534 citations, and 15,620 total link strength, respectively. Spain is seventh, tenth, and sixth with 132 documents, 837 citations, and 16,193 total link strength, respectively. Netherlands is eighth, fifth, and eighth with 129 documents, 1536 citations, and 14,242 total link strength, respectively. Canada is ninth, fourth, and thirteenth with 111 documents, 1579 citations, and 9199 total link strength, respectively. Sweden is tenth, eighth, and fourth with 105 documents, 1374 citations, and 17,484 total link strength, respectively.

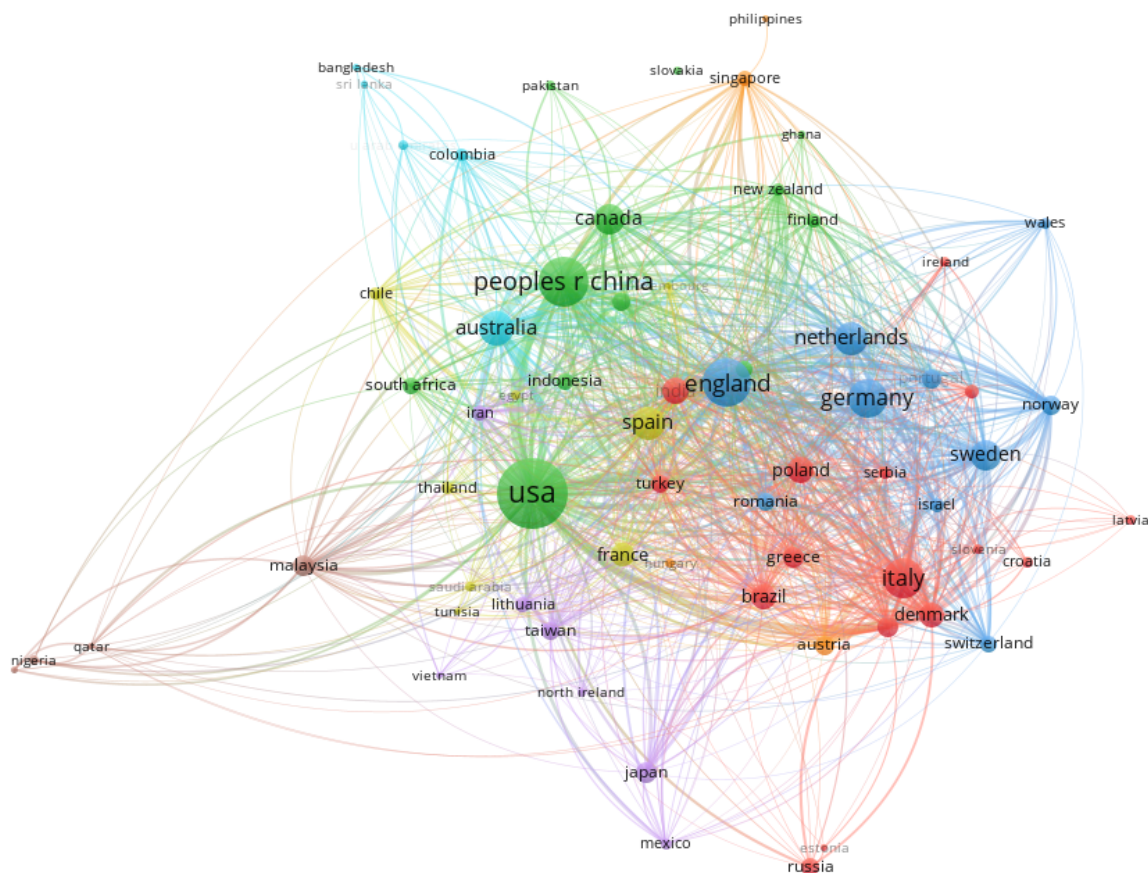


Figure 7. Sustainable transport network co-authorship among countries: 66 countries, out of 104 nations, which meet a minimum number of documents requirements in a region of five.

In sustainable transportation research, we have also listed the most important institutions (see Figure 8). The top 10 major universities in this list are the Delft University of Technology, with 46 documents (1st), 641 citations (3rd), and 1790 total link strength (9th); the University of Hong Kong, with 28 documents (2nd), 674 citations (2nd), and 2766 total link strength (3rd); the University of Leeds, with 28 documents (2nd), 342 citations (9th), and 1923 total link strength (8th); the University of Oxford, with 27 documents (4th), 1052 citations (1st), and 2866 total link strength (2nd); the University of Georgia Institute of Technology, with 25 documents (5th), 519 citations (4th), and 1425 total link strength (12th); the Hong Kong Polytechnic University, with 22 documents (6th), 334 citations (12th), and 1430 total link strength (11th); the University of Michigan, with 22 documents (6th), 368 citations (7th), and 598 total link strength (63rd); the University of Denmark, with 21 documents

(8th), 157 citations (28th), and 2900 total link strength (1st); the University of University College of London, with 20 documents (9th), 391 citations (5th), and 1078 total link strength (27th); the Arizona State University, with 19 documents (10th), 146 citations (30th), and 1397 total link strength (14th); and finally, the Queensland University of Technology, with 19 documents (10th), 73 citations (65th), and 1036 total link strength (29th).

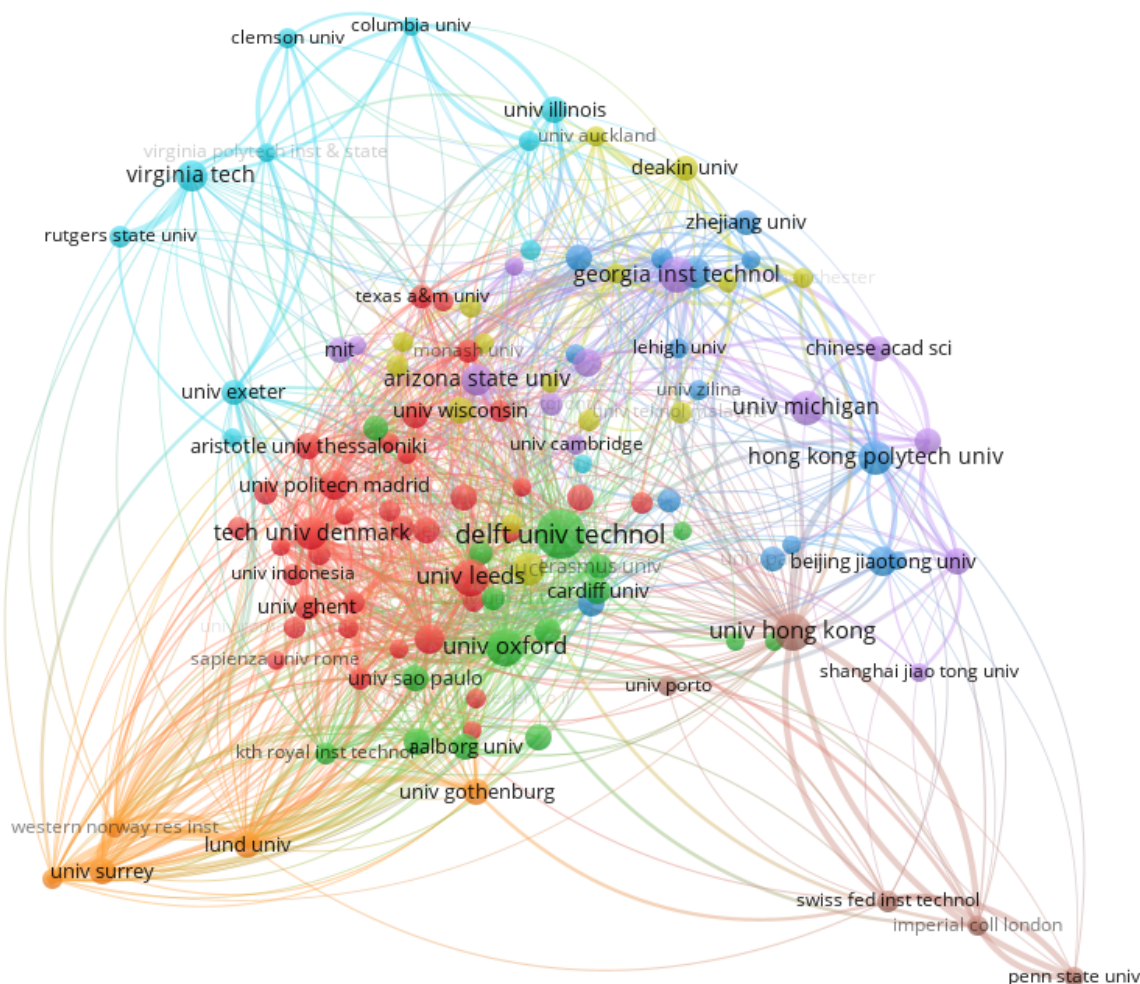


Figure 8. Co-authorship versus institutions linking sustainable transport: 116 organizations, out of 2423, comply with a minimum threshold of 7 records.

4. Discussion and Conclusions

This article aims to analyze the sustainability studies on the sustainable transport infrastructure containing 2997 articles with 78,320 references using the WoS core collection database between 2000 and 2019. We used keywords, co-citation, bibliography, and co-author analysis. The paper analyzed the previous studies on sustainable transport and the sustainable transport infrastructure bibliometric in general. We have developed bibliometric studies and visualizations using the VOS display with a view partly to sustainable transport infrastructure papers because of insufficient sustainable transport literature studies, as well as with a view to economic returns and bibliometric relevance.

The paper demonstrates the interdisciplinary nature of the method and the emphasis on the specific features, principles, interpretations, transport infrastructure, and the more practical and empirical study of sustainable transportation science, incorporating it and bringing together economic, social, and environmental aspects. Although there have been many publications of over 10,000 papers in sustainable research since 2015, these increases have converted into sustainable transport literature, and the growth in sustainable transportation literature is still remarkable. However, there is still

little literature on sustainable transport infrastructure in connection with an economic return, with only 77 papers in the last twenty years. The leading journals in this research area were the Journal of Sustainability, the Journal of Cleaner Production, and the International Journal of Sustainable Transportation, whereas the Sustainability, Applied Energy, and Energy Policy journals are the three journals that were responsible for the specific area of sustainable transport relating to economic returns. Moreover, although they consist a relatively young field of study, transport research and the specific field of economic returns have increased and spread across multiple academic disciplines.

We have identified the most relevant keywords, authors, and journals that made a significant contribution to sustainable infrastructure development in 2997 articles with 78,320 references in studies. The keyword co-occurrence analysis focuses on leading topics in sustainable transport infrastructure, with the most popular keywords being sustainability, sustainable development, sustainable transport, sustainable mobility, sustainable transportation and infrastructure, and so on. Moreover, the co-citation analyses reveal that the articles of Banister [50], Jeon et al. [54], and Litman and Burwell [8] ranked first, second, and third among the 2997 papers most mentioned on sustainable transport, respectively. Further, the co-citation network of journals indicates the presence of five journal clusters, of which the Journal of Cleaner Production, the Transport Research Journal Part D: Transport and Environment, the Journal of Transport Geography, and the Transport Policy and Energy policy journals led the first, second, third, and fourth clusters, respectively. Additionally, the author's co-citation analysis shows five clusters. The first cluster, led by Litman and Burwell [8], approaches sustainable transport system sustainability definitions, indicators, and metrics. The next cluster focuses on the typology evaluation of socio-technical pathways, and is led by Geels and Schot [58]. The third cluster, led by the European Commission [60], focuses mainly on performance indicators for sustainable urban transport. The fourth, led by Banister [50], mainly focuses on analyzing the sustainability of cities and intercity transport services, i.e., the rapidly developing high-speed rail that entails large amounts of investments and has complex impacts on traditional aviation services, travel demand, and transportation. We also established that, as a result of multi-modal transport systems, sustainable transport investment provides better connections to products, materials, and final goods to improve the efficiency of the global supply chain in development in the fourth cluster, and finally, the last cluster, led by May [65], focuses mainly on urban transport policy and the challenge of meeting climate change goals.

We also visually mapped the analytical structure using the authors' bibliographic pairing and co-authorship analysis, and accordingly identified subfields or research topics. Accordingly, the bibliographic coupling of the authors described in six key clusters, with Gossling (975 link strength, 13 documents) leading the first cluster. Holden (597 link strength, five papers) is seventh in link strength and leads the red cluster. Victor (1634 link strength, seven documents) is first in link strength and also leads the green cluster. Eugenio (1598 link strength, six documents) is second in link strength and also the second leading the green cluster. Norbert (163 link strength and five documents) is twentieth in overall link strength and leads the blue cluster. In the fourth yellow cluster containing five items, Zhang (301 total link strength and six documents) is thirteenth in link strength and leads the yellow cluster. Bucher (970 link strength and five documents) is fourth in link strength and leads the pink cluster; and finally, the sixth cluster is the emerald green cluster containing two items, of which Makarova (125 link strength and five documents) is twenty-ninth in link strength and leads the emerald green cluster.

Moreover, the sustainable transport co-authorship analysis shows that the four leading clusters are predominant (USA, England, The Republic of China, and Italy). The research reveals that the Delft University of Technology, the University of Hong Kong, the University of Leeds, the University of Oxford, the Georgia Institute of Technology, Hong Kong Polytechnic University, the University of Michigan, the University of Denmark, University of University College of London, Arizona State University, and the Queensland University of Technology are the leading institutions studying the area. The analysis reveals that some universities collaborate.

Finally, we also define sub-areas that represent a field of research on sustainable infrastructure for transport, major research routes, the importance of sustainable transportation in literature, and some exciting scholarly developments in sustainable infrastructure for transport. Such issues are central in the evaluation of different policies for practitioners. The study identified differences and links among the different areas of sustainable transport research and showed that new concepts are increasing, which opens up new areas of research. This is particularly important for researchers. The literature also points to the need for more work on transport sustainability, its effect on issues about metrics that assess sustainability, and economic indicators. The conclusions of this review, therefore, provide a basis for an evaluation of the future development of this sustainable research line. We also hope that the results will be used to guide future research to explore the link between transport infrastructure and sustainability. In general, our study provides an insight into the paradigms of today, the central areas of research, and the interrelation between the fields involved in the studies of sustainable transport infrastructure. In the meantime, this study also highlights the shifts in the main subjects and sub-areas of the past 20 years and shows the variances in future research topics. We believe that our results can provide researchers with some knowledge and contribute in part to the further advancement of studies of sustainable transport systems.

Nevertheless, like any other study, there are some limitations to this study. For instance, the study used the WoS core collection database as a source of data, taking into consideration only papers, reviews, and notes. Even though this approach offers the most important and critical analysis, further studies might supplement this by looking at particular kinds of secondary records in the database to discover the trends. The assessment of individual reporting styles, like PhD theses or other research in other languages, can also be expanded through the utilization of other data sources.

Author Contributions: Data curation, B.B.B. and B.S.; formal analysis, B.B.B., B.S., and L.Q.; investigation, B.B.B., B.S., and L.Q.; methodology, B.B.B., B.S., and L.Q.; software, B.B.B.; supervision, B.S.; validation, L.Q.; visualization, B.B.B.; writing—original draft, B.B.B. All authors have read and agreed to the published version of the manuscript.

Acknowledgments: The research presented here was supported by the National Key R&D program of China (grant number 2017YFB1401800) and the National Natural Science Foundation of China (grant numbers 71774042 and 71850013). We are thankful for their support. We also fully acknowledge the editors and reviewers who have contributed their time and expertise to review the manuscripts.

Conflicts of Interest: The authors declare no conflict of interest.

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