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REVIEW

A review of two decades of research on sustainable regional and trans-border infrastructure

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Abstract

Despite the budding interest of researchers, policymakers and practitioners, there are still differing and disjointed conceptualizations of sustainable regional and trans-border infrastructure (SRTBI) as its meadow is still emerging. To fill this research gap, the study resolved to appraise and fuse SRTBI studies to afford the generation of boulevards for future enquiries. Studies issued from 2003 to 2023 were sourced from Scopus database to undertake this review. Designated keywords from a rigorous review of literature were pooled with Boolean operators and searched. Subsequently, a scrupulous screening procedure was assumed to choose the pertinent papers. The designated papers on SRTBI were successively fused for auxiliary acumens. The SRTBI turf is bitty, yet it has advanced within the preceding two decades in diverse ways. The study identified core journal vents and papers, key constructs, and methodologies deployed in the SRTBI literature. Based on the findings, future research paths were suggested. The study can significantly impact academia and organisational research literature, and it can extend theoretical perspectives of repercussions of resolutions made to espouse SRTBI. Adding to its hypothetical value, the study has significant repercussions for policy and practise, as it would expand viewpoints on decisions to adopt SRTBI. The study was based on documents retrieved from Scopus and any limitations of the database may have repercussions for the findings. This inquiry was imperative to review the present condition of literature on SRTBI and instigate boulevards for future studies.

Keywords: Regional Infrastructure, Trans-Border Infrastructure, Sustainability, Sustainable Development Goals

Introduction

There are numerous intimidating and interrelated challenges encountered by developing countries in the quest for a determined sustainable development agenda (UNCTAD, 2022). Yet, in the face of these challenges most countries are still poised to achieve the ninth sustainable development goal (SDG), specifically SDG 9.1 that intends to cultivate valuable, dependable, sustainable and robust infrastructure, including regional and trans- border infrastructure, to facilitate economic progress and welfare of humans, with an eye on inexpensive and impartial access for everyone. Despite the burgeoning interest of researchers, policymakers and practitioners, there are still divergent and disjointed conceptualizations of SRTBI since its field is still evolving. Many researchers have studied the sustainability of regional and trans-border infrastructure along different themes. For instance, the works of researchers such as Fan and Chan-Kang (2004), Geurs *et al*. (2009), Hanssen et al. (2012), Rodrigue et al. (2013), and Dorhetso and Tefutor (2023) have studied the importance of a sustainable and robust transport infrastructure. The UNCTAD (2022) report focused on regional trade integration and development. Other studies such as Shaw, Attree and Jackson (2010), Pierre et al. (2017), and Kvon et al. (2019) also focused on the energy component of SRTBI. These divergent and disjointed conceptualizations of SRTBI, as explicated with exemplifying studies, has the tendency of undermining some other unidentified but potentially essential themes. To close this research fissure, the resolution of this treatise was to review and synthesize SRTBI research to unveil the visibility or otherwise of relevant modules of SRTBI, and to offer paths for studies in future.

Papers issued from 2003 to 2023 were sourced from Scopus database to perform this review. Designated keywords from a rigorous review of literature were assembled with Boolean operators and searched. Successively, a scrupulous screening procedure was used to choose the germane articles. The designated papers on SRTBI were subsequently synthesized for further insights. The SRTBI arena is patchy and has progressed within the preceding two decades in varied ways. The study acknowledged core journal vents and papers, key constructs, and methodologies deployed in the SRTBI literature. Founded on the treatise's findings, future research paths were suggested.

The study can significantly impact academia and organisational research literature, and it can extend theoretical perspectives of repercussions of resolutions made to espouse SRTBI. Adding to its hypothetical value, the study has significant repercussions for policy and practise, as it would expand viewpoints on decisions to undertake SRTBI. The study was based on documents retrieved from Scopus and any limitations of the database may have repercussions for the findings. This inquiry was imperative to review the present condition of literature on SRTBI and instigate avenues for future studies.

Materials and Methods

As previously elucidated, the purpose of this contemporary research was to ascertain fissures in contemporary research literature to proffer propositions for studies in future. Henceforth, as used by scholars such as Paul and Benito (2018) and Eteokleous *et al*. (2016), a systematic literature review was found fit based on the specific objective of the study. There are several forms of systematic review documents. These include bibliometric reviews (Dorhetso *et al*., 2023; Fakhar Manesh *et al*., 2020); and structured reviews (Kahiya, 2018). The author adopted a structured review tactic for this treatise for a presentation of the scholarly assembly of the research arena of SRTBI, consequently situating a plan for future enquiries. As elucidated by prominent researchers such as Paul and Barari (2022), structured reviews are hinged on extensively deployed concepts, theories, constructs, and methods. This technique facilitates the identification of fissures in literature. To ensure consistency in the quality of papers (Liu *et al*., 2012), peer-reviewed published research articles indexed in Scopus were used for the study.

Research domain

In this contemporary study, both theoretical and empirical jour-

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nal articles published between 2003 and 2023 were reviewed to synthesize SRTBI research literature. As "sustainable infrastructure" is rationally unambiguous in extant literature, this review was focused predominantly on nominated articles that are akin to SRTBI. This treatise endeavoured to solve the following research queries: How can SRTBI research literature be systemized to identify developments in SRTBI studies via perusing documents encapsulating critical concepts, theories, constructs, and methodologies? and what are the plans and implications for future studies?

Search criteria and reporting procedure

Scopus was the main database used to source material for this study. Keywords were painstakingly picked according to the scope of the study and combined with Boolean operators to construct a search string that was inputted into the Scopus database. Focal keywords such as Sustainable Trans-Border Infrastructure, Regional Trans-Border Infrastructure, Sustainable Regional Infrastructure, Regional and Trans-Border Infrastructure, Regional Infrastructure, Trans-Border Infrastructure, and Sustainable Regional and Trans-Border Infrastructure were amalgamated to form the search string. The database search on February 04, 2023, initially yielded 508 documents, which were limited by the researcher to 438 documents published between 2003 and 2023. The search was then limited to only environmental science, engineering, economics, econometrics and finance and energy papers, and this produced 254 papers.

Upon further limitation to only journal articles published in the English language, the search yielded 121 papers. Finally, the search on the Scopus database was limited to only journals ranked in the ABDC journal eminence list (Lu *et al*., 2016), and this produced 36 published journal articles about SRTBI between 2003 and 2023. Upon evaluating the papers with these standards, the abstracts of the ultimate 36 papers for the two decades of research on SRTBI were thoroughly read to ascertain if they were significantly related to SRTBI literature. Out of the 36 abstracts read, one (1) was found to be irrelevant to the current study and the remaining 35 were then further synthesised. The search criteria, procedure and results are reported using the PRISMA 2020 flow diagram (McKenzie *et al*., 2020) as shown in Figure 1.

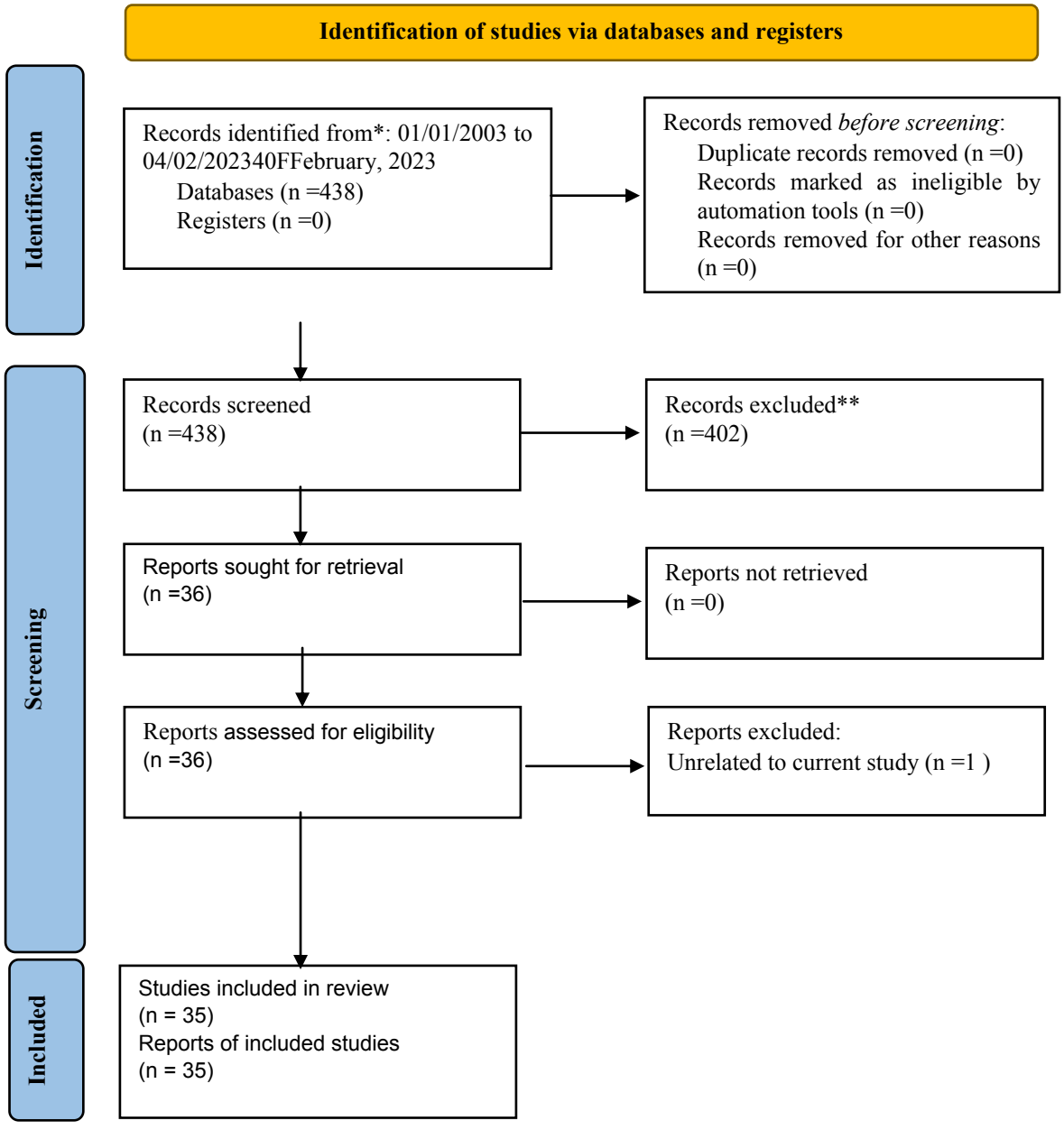

Figure 1 PRISMA 2020 flow diagram of reportage of search criteria, procedure and results

Results and Discussion

The review conducted to synthesize the identified literature on SRTBI initially addressed the diverse themes of studies on SRTBI, before budging to the bibliometric facets of the papers, notably the journals apertures and citations. A review of methods deployed in SRTBI research (statistical methods and main methodologies used in SRTBI literature) was subsequently conducted.

Thematic analysis

A catalogue of the research themes in SRTBI (2003–2023), which have neither conclusive traits nor mutual distinctiveness, were identified from a synthesis of articles of concern in this review. The study identified seven main research themes: planning and development of sustainable regional infrastructure; Africa's regional infrastructure development and China's belt and road initiative (BRI); integration of regional infrastructure in south America (IIRSA); regional infrastructure and firm/ public investment; energy component of regional infrastructure; threatening and enabling of regional infrastructure; and regional infrastructure, innovation, research, and development (R&D). Table 1 evinces the themes with their corresponding number of articles and authors.

The first theme synthesised from literature, as exuded in Table 1, entails planning and development of sustainable regional infrastructure. Articles by Magalhães (2016), Kirchhoff *et al*. (2011), Carroli (2018), Hudalah *et al*. (2022) are typical examples of papers discussing planning and development of sustainable regional infrastructure. Strategic environmental assessment (SEA) is regarded as a tool that is indispensable to grasping sustainability objectives that surpass mission-rate activities. Kirchhoff *et al*. (2011) conducted an incident grounded, concerted study to spread applied and hypothetical comprehension of SEA to the connected procedures of mission-rate ambience evaluation, principal organisation and provincial land usage design. Their study adds on to the use of SEA at the metropolitan level, as well as acmes its significance as an approach contributing to soundly learnt, rated and incorporated organisation and verdict building that is buttressed by sustainable objectives. Improvement in the transport arrangement course's sustainability at several resolution stages has reinforced the prerequisite for explicit pointers to support sound resolutions. In the resolution framework, the utmost prevalent pointers aimed at state and provincial scrutiny are founded on a bequest of partial knowhow as well as information accessibility (Magalhães, 2016). Magalhães (2016) synthesized and developed roadway coverage index (RCI) to be a transport spatial coverage index (TSCI) founded on models as well as features of explicit pointers, by means of accessible instruments, considering system spatial behaviour. It was found that, grounded on its organisation, TSCI is extra vigorous as well as consistent beyond supplementary methods such as population density, spatial density, and. network extension. Additionally, it has rigorous and suitable traits aimed at designers and architects of resolution for state and provincial infrastructure organisation. Carroli (2018) conducted an integrative literature review to identify the functions of planning in viable infrastructure system shifts. Human settlements, predominantly towns and their nearby districts, are places of infrastructural concentration and accumulation, bestowing trials as well as prospects for viable growth. Tactical spatial planning and viable shifts both inspect associations pertaining to of built-up, provincial and infrastructural maintainability.

The second theme synthesised from the reviewed literature encapsulates the provincial infrastructure growth of Africa as well as the belt and road initiative (BRI) of China. China's BRI builds a machinery that facilitates and promotes connectivity-linked infrastructure amidst states via modes that include trans-border developments as well as making up for old-fashioned funding regimes. The BRI regime principally seeks a reduction in the cost of trade between participating states and China, partially through the facilitation of incorporation of provincial arcades (Ghossein *et al*., 2021). The BRI has an external gaze, forming a piece the external strategy of China. On the contrary, the contemporary provincial infrastructure packages in Africa principally have an inward gaze since countries strive toward developments in provincial assimilation in the region (Lisinge, 2020). Lisinge (2020) posits through the lens of international cooperation theory that there could be a possible collaboration between Africa and China towards applying BRI even with an ostensible clash between their infrastructure linkage goals. It was argued that policies could be synchronised to bring forth joint advantage via enhanced linkage as well as commerce amid China and Africa on a side of the coin and developed African provincial incorporation and intra-African commerce on the opposite side. It may be possible to achieve this through deployment of the provincial platforms in Africa to act as ingredients for collaboration in BRI. However, the extensive borrowing related to BRI projects has aroused impending loan overhauling as well as sustainability issues. BRI provincial infrastructure schemes' rate of return partially relies on the veracity of municipal acquisition procedures as well as appreciating accountability goals (Ghossein *et al*., 2021). The Africa Continental Free Trade Area (ACFTA) offers a chance towards formation of an African intra-continental electricity arcade that can stimulate an effective expansion of energy infrastructure as well as interdependent power commerce amidst participants in the five provincial electric energy hubs in Africa. Odetayo and Walsh (2021) proposed a framework to couple the prospects offered by the ACFTA via the harmonisation of operational and business activities of the provincial African energy hubs.

The third theme revolves around the initiative for the integration of regional infrastructure in South America (IIRSA). Bonilla Bolaños (2017) used data from Argentina and Brazil to study how the public provision of transportation infrastructure influences output convergence and trade integration in a two-nation dynamic general equilibrium model that has the transportation cost between nations endogenously determined by the pile of public infrastructure in both nations. The IIRSA served as the case of study, and the findings posited that proliferating public investment in infrastructure gives an incentive to commercial integration but does not essentially create output convergence. Also, the model confirms that the only way for the two nations to achieve output convergence is to harmonize their augmentations on public infrastructure, as the IIRSA proposed. Zhouri (2010) investigated the impacts of partisan leaders and armed services in Brazil on state clarifications of conservationism as well as rights of native persons, and factored creation of enduring imaginings as well as thoughts disseminated via cost-effective strategies such as the IIRSA. and transnational ecological creativities including tumbling discharges of greenhouse gases because of tree cutting and forest dilapidation in some third world nations.

The fourth theme is hinged on regional infrastructure and firm or public investment. Aiello, Iona and Leonida (2012) modelled the paths through which public disbursement on infrastructure impacts firm worth and contours its investment choices through both adjustment costs and marginal profitability of capital. They tested their hypotheses using a hefty panel of firms in Italy and found that infrastructure intermingles with revenues and costs in determining a firm's capital profitability

and influences its adjustment costs. They also found that infrastructure disbursement contributes to the lessening of the economic gap between the northern and southern parts of Italy and the effects varied across regions and sectors. Provincial infrastructure programs, by way of a proliferation in municipal assets, are extensively deployed for a stimulation of an improvement in inferior provinces of states in Europe. Bajo-Rubio and Díaz-Roldán (2005) investigated how optimal the delivery of state wealth to cover the issue of the Spanish provinces from 1965 to 1995. Thus, a simple circumstance of optimality was obtained from an optimization growth model in that, peripheral yields of personal as well as municipal wealth must be at par. According to their findings, state wealth might be shorting supply to the extra fecund provinces, contrasting from the less fecund provinces and vice versa, presuming that personal wealth was delivered optimally. Jiang *et al* (2020) empirically tested the potential impacts of provincial infrastructure ventures on provincial per capita income progression as well as provincial total factor productivity development. A negative influence of the former on the latter was found. Moreover, the results of a variance putrefaction task performed suggested that regional infrastructure investment has no effect on regional economic development because of its impact on regional total factor productivity development. Castells and Solé-Ollé (2005) analyzed the main elements of the provincial distribution of infrastructure assets by use of panel data regarding commerce and the assets store of transport infrastructure with respect to the Spanish sectors. Their findings suggested that efficacy standards only partially function in the topographical dissemination of regime infrastructure assets. They found particular provincial infrastructure requirements and partisan influences to be issues that explicate the provincial distribution of infrastructure assets. Zheng *et al*. (2013) used spatial panel methods for a scrutiny of elements of provincial distribution of infrastructure assets from the Chinese state, by way of sampling 31 regions. Their empirical findings revealed that: significant spatial influences of the state's assets subsist amid provinces; the state's assets unveil an extremely tenacious influence; the state endeavors to poise fairness and efficacy during policymaking; and partisan issues function importantly in provincial infrastructure ventures. Zolotareva *et al*. (2016) designated a procedural method to assess assets in provincial infrastructure through the lens of infrastructure marketing that was distinct from existing approaches and allowed the consideration of the development of infrastructural components.

The fifth theme revolves around the energy component of regional infrastructure. Energy is one of the most important components of regional infrastructure, as it ensures the solution of crucial problems of the populace and firms of the regions in attaining energy and heat supply facilities. Kvon etal. (2019) studied issues with a perspective to analyze, assess and shape the cost benefits of the ushering of energy-efficient innovative technologies for heat-saving of public firms. Their study unveiled the features of the cost benefits formation, their structure, and characteristics of these technologies. Improving the sustainability of power schemes can modify prevailing configurations of power requirement and production, enacting practical, saleable, as well as statutory amendments to power network schemes (Shaw *et al*., 2010). Shaw *et al*. (2010) identified rigidities in monitoring strategy and recommended modifications of the monitoring arrangement towards a futuristic reduction of carbon emission prints. They identified the possible gains from a new way of enabling reusable power supply bills for heat supply and electric power. Pierre *et al*. (2017) assessed spatio-temporal drifts of infrastructure trails, power generation, as well as land scene alteration using well defined pictures, and information on pipe conduits for charting the subject's infrastructure. Their study presented an outline to facilitate charting of land scene modification out of infrastructure growth of gas as well as oil, which is applicable to supplementary power expansion policies, including solar turfs and windmill fields, as well as supplementary provincial infrastructure expansion strategies.

The sixth theme highlights both the threatening challenges and enabling factors of regional infrastructure. Arbuthnott *et al*. (2011) demonstrated how prospects regarding provincial regeneration in a marginal province could be abridged through unbending danger reactions started through recognized companies functioning in the customary provincial business. Using a case study of innovative bio refinery business ingenuities in a province of a flagging customary forestry business of tissue-and-paper, Arbuthnott *et al*. (2011) made use of both firsthand and archival data for demarcating how novices in the business who fashioned inventive methods for deploying prevailing provincial infrastructures as well as assets flickered firm danger reactions amidst recognized companies of the frazzled old-fashioned business. They found that conventional business companies outlined fresh business ingenuities to be intimidations, which were countered through: plummeting fresh business players' likelihoods to enhance a fresh industry; carrying out deep-rooted opposition; forming cooperative delusions; as well as dejecting rudiments pertaining to the fresh business.

Table 1 SRTBI themes

Themes	Number of Papers	References
Planning and development of sustainable regional infrastructure	4	Magalhães (2016); Kirchhoff et al. (2011); Carroli(2018); Hudalah, Talitha and Lestari (2022).
Africa's regional infrastructure development and China's BRI	3	Lisinge (2020); Odetayo and Walsh (2021); Ghossein, Hoekman, Shingal and (2021).
IIRSA	2	Bonilla Bolaños (2017); Zhouri (2010).
Regional infrastructure and firm/public investment	6	Aiello, Iona and Leonida (2012); Bajo-Rubio and Díaz-Roldán (2005); Jiang, Jiang and Zheng (2020); Castells and Solé-Ollé (2005); Zheng et al. (2013); Zolotareva et al. (2016).
Energy component of regional infrastructure	3	Kvon etal. (2019); Shaw, Attree and Jackson (2010); Pierre et al. (2017).
Threatening and enabling of regional infrastructure	2	Arbuthnott etal(2011); Chapain and Comunian(2010).
Regional infrastructure, innovation, research, and development (R&D)	3	Sivak, Caplanova and Hudson (2011); Ling (2015); Ke and Lai (2011).

Table 2 Journal list

Title of Journal	Number of Papers	Authors	Percentage
Journal of Transport Geography	1	Magalhães(2016)	2.86%
Transnational Corporations Review,	1	Lisinge (2020)	2.86%
Resources Policy	1	Zhang and Moffat(2015)	2.86%
International Economic Journal,	1	Bonilla Bolaños(2017)	2.86%
Empirical Economics	1	Aiello, Iona and Leonida(2012)	2.86%
Journal of Environment and Development	1	Zhouri(2010)	2.86%
Economic Inquiry	1	Sanz-Córdoba and Theilen 2018)	2.86%
International Journal of Energy Economics and Policy	1	Kvon etal.(2019)	2.86%
Entrepreneurship and Regional Development	1	Arbuthnott etal(2011)	2.86%
Impact Assessment and Project Appraisal	1	Kirchhoff etal.(2011)	2.86%
Regional Studies	3	Matas, Raymond and Ruiz(2018); Bajo-Rubio and Díaz-Roldán (2005); Chapain and Comunian(2010)	8.57%
Papers in Regional Science	1	Westin et al.(2012)	2.86%
International Journal of Economics and Financial Issues	1	Dyrdonova (2016)	2.86%
Journal of Urban Planning and Development	1	Li etal(2019)	2.86%
Energy Policy	2	Shaw, Attree and Jackson(2010); Odetayo and Walsh (2021)	5.71%
Environmental Innovation and Societal Transitions	1	Carroli(2018)	2.86%
Emerging Markets Finance and Trade	1	Jiang, Jiang and Zheng(2020)	2.86%
Post-Communist Economies	1	Sivak, Caplanova and Hudson(2011)	2.86%
Environment and Planning C: Politics and Space	1	Hudalah, Talitha and Lestari(2022)	2.86%
Regional Studies, Regional Science	1	Ling and Martins (2015)	2.86%
Journal of Korea Trade	1	Kang and Lee(2013)	2.86%
Water Resources Research	1	Zeff etal.(2016)	2.86%
Regional Science and Urban Economics	1	Fenge, von Ehrlich and Wrede(2009)	2.86%
European Economic Review	1	Castells and Solé-Ollé(2005)	2.86%
International Regional Science Review	1	Ke and Lai(2011)	2.86%
Environmental Management	1	Pierre et al.2017)	2.86%
World Bank Research Observer	1	Ghossein, Hoekman, Shingal and (2021)	2.86%
China Economic Review	1	Zheng et al. (2013)	2.86%
Safety Science	1	Rehak(2020)	2.86%
Applied Energy	1	Xie ad Lin (2021)	2.86%
Journal of Development Economics	1	Lall, Shalizi and Deichmann (2004)	2.86%
Journal of Applied Economic Sciences	1	Zolotareva et al. (2016)	2.86%
Total	35		100%

Chapain and Comunian (2010) integrated results of two distinct studies to explore issues which facilitate or constrain growth of inventive as well as traditional businesses in English provinces freestanding of London. Their verdicts interrogate contemporary inventive as well as traditional businesses strategies and their comprehension of the native and provincial contexts to be restricted to the indication of topographical assemblages. They recommended a wider approach that considers the significance of the provincial infrastructure as well as the puddle of awareness required for growing of inventive and traditional businesses, as well as individual and working networks of the inventive and traditional businesses in and out of their province.

The seventh theme of this current review of literature on SRTBI is regional infrastructure, innovation, research and development (R&D). Sivak *et al*. (2011) examined innovation by categorizing it into four facets: ushering in a new service or product; upgrading a /service or product; research and development; as well as technology certification. They found that provincial infrastructure that is estimated in diverse magnitudes by regime strategy, is important to the estimation of invention. Ling, Martins (2015) empirically scrutinized the mode of online dialogues used by provincial players to ponder on the scope of encounters as well as activities of direct consequence on the native initiative company's growth program. They findings revealed that online placements articulated anxieties neighboring three key subjects: provincial infrastructure to facilitate knowledge sharing between companies; proceedings to foster interactions; and paths towards trans-nationalization. Their enquiry offers a rehabilitated hypothetical as well as applied perspective of system knowledge sharing, particularly connected to invention undertakings in a provincial setting. Ke and Lai (2011) scrutinized the causes as well as overflows in provinces with provincial output and multinational enterprise (MNE) research and development in China. They found supply -side factors, approachability of experts and engineers, the mean salary of workers in the research departments, provincial infrastructure, and overflows in MNE research within neighboring provinces to be the key factors that influence the situation of MNE research and development. Demand-side factors including the scope of provincial arcade and the preceding overseas direct investment were not found to be substantial factors. The productivity equation they used unveiled a substantial causative association amid MNE research and development ventures as well as provincial output, and the approximations evinced that provincial output is also estimated through output in the trans-border provinces, and not solely through element feeds in the originating province.

Journals

Table 2 exudes the allocations of papers by journals in which they were published. The 35 papers on SRTBI were published in an extensive collection of bulletins and reveal twenty years of studies within the zone of SRTBI. Out of the 32 publication apertures that issued the 35 papers, Regional Studies published the most (3 papers with 8.57 percent), followed by Energy Policy (2 papers with 5.71percent). Each of the rest of the thirty outlets issued just a paper each on the subject matter. The extensive array of publication orifice reporting depicts the varied leanings that scholars as well and publishing houses have. The ABDC categorisation (ABDC, 2019) that enjoys an extensive transnational influence, was employed to judge the value of the research outlets selected for this review.

Table 3 Most cited papers on SRTBI in the course of the past twenty years (citation tallies as of February 4, 2023)

References	Type of Paper	Citation Tally	Citation Rankings
Zhang and Moffat(2015)	Empirical	53	5
Zhouri(2010)	Review Paper	30	8
Kvon etal.(2019)	Empirical	15	14
Arbuthnott etal(2011)	Empirical	11	16
Kirchhoff etal.(2011)	Qualitative	14	15
Li etal(2019)	Quantitative	29	10
Shaw, Attree and Jackson(2010)	Qualitative	31	7
Carroli(2018)	Review Paper	18	13
Sivak, Caplanova and Hudson (2011)	Empirical	24	11
Chapain and Comunian(2010)	Empirical	111	3
Zeff etal.(2016)	Empirical	69	4
Fenge, von Ehrlich and Wrede(2009)	Empirical	10	17
Castells and Solé-Ollé(2005)	Empirical	114	2
Ke and Lai(2011)	Empirical	10	17
Pierre et al.2017)	Empirical	20	12
Zheng et al. (2013)	Empirical	49	6
Rehak(2020)	Case study	30	8
Lall, Shalizi and Deichmann (2004)	Empirical	127	1

Note: Only articles having 10 or more citations were encompassed.

Citation analysis

As elucidated by Lu *et al*. (2016), the impact of scholarly work was assessed by a citation count. Table 3 presents the topmost 18 articles with regards to the total number of citations. In a declining order, the topmost 3 cited papers were: Lall *et al*. (2004); Castells and Solé-Ollé (2005); and Chapain and Comunian (2010), with over 110 total citations each. The most cited article, "Agglomeration economies and productivity in Indian industry" by Lall *et al*. (2004), was published in the Journal of Development Economics. This was followed by "The regional allocation of infrastructure investment: The role of equity, efficiency and political factors" by Castells and Solé-Ollé (2005), published in European Economic Review. The third topmost paper in terms of citation is "Enabling and inhibiting the creative economy: The role of the local and regional dimensions in England by Chapain and Comunian (2010), published in Regional Studies.

Review of SRTBI research methods

Comprehensive synopsises of both the statistical methodologies and main methodologies used in SRTBI research are presented in Table 4 and Table 5 respectively.

Statistical methods used

Most of the articles synthesised were conceptual and review papers. A total of eight out of the thirty-five papers on SRTBI (twenty-three percent) were conceptual and review papers. A scrutiny of this sort is reasonable for enquires investigating the scopes of SRTBI that is a multifaceted and multi-layered paradigm. Supplementary statistical approaches employed encompassed correlation and regression (in seven papers), quantitative analysis (in six papers), case study (in five papers), panel data analysis (in four papers), three modelling papers, and two qualitative papers. A comprehensive synopsis of these statistical methodologies employed in SRTBI literature is evinced in Table 4.

Table 4 Statistical methods used in the SRTBI literature

Analysis	Number of Papers	Percentage(%)
Correlation and regression	7	20
Panel data	4	11
Quantitative	6	17
Qualitative	2	6
Modelling	3	9
Case study	5	14
Conceptual and review papers	8	23
Total	35	100

Table 5 Main methods in SRTBI research

Main Method	No. of Papers	Authors	Percentage (%)
Conceptual and review articles	8	Magalhães (2016); Lisinge (2020); Zhouri(2010); Westin et al.(2012); Shaw, Attree and Jackson(2010); Carroli(2018); Zeff etal.(2016); Ghossein, Hoekman, Shingal and (2021).	23
Case study	5	Bonilla Bolaños(2017); Arbuthnott etal(2011); Kirchhoff etal.(2011); Hudalah, Talitha and Lestari(2022); Rehak(2020).	14
Qualitative analysis/ Interview/Content analysis	3	Chapain and Comunian(2010); Ling and Martins (2015); Odetayo and Walsh (2021).	9
Quantitative analysis	15	Sanz-Córdoba and Theilen (2018); Kvon etal.(2019); Matas, Raymond and Ruiz(2018); Dyrdonova (2016); Li etal(2019); Bajo-Rubio and Díaz-Roldán (2005); Jiang, Jiang and Zheng(2020); Kang and Lee(2013); Fenge, von Ehrlich and Wrede(2009); Castells and Solé-Ollé(2005); Ke and Lai(2011); Zheng et al. (2013); Xie ad Lin (2021); Lall, Shalizi and Deichmann (2004); Zolotareva et al. (2016).	42
Primary data	1	Zhang and Moffat(2015).	3
Secondary data	3	Aiello, Iona and Leonida (2012); Sivak, Caplanova and Hudson (2011); Pierre et al. (2017).	9
Total	35		100

Main methodologies used in SRTBI literature

The rate of recurrence with which different methodologies were used in the papers synthesized is evinced as a matrix in Table 5. From the table, it is evident that quantitative analysis prevailed as the utmost deployed methodology in SRTBI studies (42 %). Authors are encouraged to experiment with different data gathering techniques to reconnoitre a comprehension of SRTBI from a subjective perspective. Qualitative means of conducting studies have greater tendencies of disclosing unexamined subjective elements that could still impact SRTBI studies. Conceptual and review papers were the next utmost popular category (23 %), signifying that the SRTBI arena of research is comparatively fresh and still evolving. Case study followed next with 14 %. The full matrix of main methodologies used is evinced in Table 5.

Roadmaps for future research

The primary goal of this section is to spell out a few immature or evolving study precincts and propose recommendations for future enquiries in the zones of theory, methods and thematic/ geographical settings.

Theoretical perspectives and conceptual frameworks of SRTBI

SRTBI is relatively an innovative idea having scarcely about thirty years of conceptual studies. A key challenge of research in this field, as observed during the thematic scrutiny of the selected papers, is that it appears to be dispersed over broad themes with different conceptual insights. The specific meaning of SRTBI is still not very clear in literature and there is an absence of a rational as well as clear hypothetical grounds in this study field. While some theories such as international cooperation theory used by Lisinge (2020) and the theoretical framework for output decomposition used by Jiang *et al*. (2020) has been used in the selected literature, a huge share of research on SRTBI has been disjointed and lack theoretical underpinnings. It is recommended that studies in future should ceaselessly usher fresh hypothetical viewpoints and assimilate concepts, theoretically presenting new techniques to analyse existing or new models.

Methodological perspectives

Future research works should ponder on deploying different information gathering techniques to reconnoitre a comprehension of SRTBI from a subjective perspective. This is more likely to provide a detailed understanding of the field from an idiosyncratic standpoint and make room for inductive reasoning (Creswell, 1998). Qualitative procedures of carrying out studies have greater propensities to disclose subjective uninvest gated aspects that can have bearings on SRTBI studies. Additionally, more primary data surveys should be encouraged in studies in future, albeit the use of case studies so far is quite impressive.

Thematic/geographical context

Only a minority of the SRTBI research literature (three out of the thirty-five papers) scrutinized in this study focused on Africa. These are the studies by Ghossein *et al*. (2021), Lisinge (2020) and Odetayo and Walsh (2021). Ghossein *et al*. (2021) as well as Lisinge (2020) studied China's BRI's interrelation with its African counterparts. A principal objective of the BRI is to decrease the cost of commerce amid China and participating nations, partly by assisting to assimilate provincial arcades.

However, the BRI is outward-looking, but Africa's contemporary provincial infrastructure schemes predominantly focus internally as they struggle to develop the region's provincial assimilation (Lisinge, 2020). Although Lisinge (2020) posits that Africa and China may collaborate in executing BRI even with an ostensible clash regarding their infrastructure linkage objectives, more research work may be required in this regard to verify this proposition. Also, more research must be conducted on the ACFTA as it provides an opening towards the formation of a sole regional power arcade within Africa that possess the vigour to arouse the effective expansion of power infrastructure and interdependent power commerce amongst participants in the five provincial electrical energy pools in Africa.

Generally, it is suggested that in future more research work is tilted towards the African geographical region to continuously analyse the forms and driving factors of SRTBI on the continent. As exemplified by Chapain and Comunian (2010) who integrated results of two distinct studies to explore issues which facilitate or constrain growth of inventive as well as traditional businesses in English provinces freestanding of London and recommended a wider approach that considers the significance of the regional infrastructure, more integrated and collaborative research amongst the regional blocs in Africa should be encouraged. Sivak *et al*. (2011) found that provincial infrastructure that is estimated in diverse magnitudes by regime strategy, is important to the estimation of invention. Also, studies by Ke and Lai (2011) and Ling and Martins (2015) corroborate their findings. However, Dorhetso *et al*. (2023) found innovation performance and efficiency of research and development intensity as a proportion of gross domestic product (GDP) in Africa to be woefully inadequate. Henceforth, it is recommended that studies in future in the SRTBI field should be directed towards the interaction between innovation and regional infrastructure in the African context, as well as the contribution of government policy and GDP share to research.

Conclusion

The limitations of Scopus database, from which the documents for the study were sourced may have implications for the findings. This inquiry fulfilled an essence for a review of the prevailing situation of literature on SRTBI and spelt out prospective research paths that could be followed for future investigations. The sifting procedure implemented during the study might have left out applicable documents, as only designated papers issued from ABDC rated journals were included. It should be noted that the designated themes of this treatise have neither conclusive traits nor mutual distinctiveness. Prospective studies may consider framing these current findings regarding their hypothetical emphasis as well as identifying idiosyncratic hotspot research zones.

This contemporary review contributes to the organisation of information on SRTBI through the means of systematically reviewing literature in the specific turf. Scholarly papers on SRTBI from the last two decades were identified, nominated and scrutinized, to lay a foundation for a synopsis of the up-to-the-minute of this sphere of research. Papers with the highest citations as well principal outlets of SRTBI studies were identified. Furthermore, drifts regarding hotspot in research, statistical methods and main methodologies used were identified. Concisely, this contemporary study acme designated fissures regarding SRTBI works and offers fresh guidelines aimed at prospective studies.

Conflict of Interest Declarations

The author declares that no conflict of interest influenced the research conducted in this report.

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