

SUSTAINABILITY TRANSITION RESEARCH AND SUSTAINABLE DEVELOPMENT: RESEARCH PRIORITIES IN THE PAST TWO DECADES AND PATHWAYS FORWARD

Sophie-Marie Ertelt^{ab}, Natalia Lyly^{c*} and Daniel A. de los Rios Pérez^d

^aCenter for Sustainable Business, School of Business, Örebro University
Örebro universitet, 701 82 Örebro, Sweden

^b Institute of Social Studies, University of Tartu
Lossi 36, 51003 Tartu, Estonia

^c LUT Business School, LUT University
Yliopistonkatu 34, 53850 Lappeenranta, Finland

natalia.lyly@lut.fi

*presenting author

^dJönköping International Business School, Jönköping University
Gjuterigatan 5, 551 11, Jönköping, Sweden

SUSTAINABILITY TRANSITION RESEARCH AND SUSTAINABLE DEVELOPMENT: RESEARCH PRIORITIES IN THE PAST TWO DECADES AND PATHWAYS FORWARD

Wordcount excluding references: 6895

SUMMARY

This paper contributes to the debate about the ability of academic research, specifically sustainability transition research, to address and advance sustainable development. It does so by mapping the field's knowledge output, analysing research priorities in relation to the United Nations' Sustainable Development Goals (SDGs) and different types of research impact. Through systematic review methods, a comprehensive analysis is performed of the field's peer-reviewed case studies ($n = 256$) from the last two decades. The findings reveal a distinct geographical bias in the examined publications, with a concentration on locations in the Global North, as well as a technocentric focus that prioritises goals related to technology and innovation. The studies also prioritise implications for public policy, often overshadowing cultural, social, and educational areas of impact. These insights inform a future research agenda grounded in the principle of indivisibility.

Keywords: Sustainability transition, Sustainable Development Goals, systematic review, research priorities, research agenda

INTRODUCTION

Problems stemming from unsustainable production and consumption patterns persist in our modern societies, despite longstanding attention and ongoing efforts from both practitioners and researchers (Komiyama & Takeuchi, 2006). In 2015, the UN launched the Sustainable Development Goals (SDGs) as part of the 2030 Agenda to reinforce the focus on sustainability and pave pathways for sustainable development (UN, 2015). The 17 SDGs represent a shared vision for worldwide sustainability, specifying critical areas for action to address global grand challenges, calling stakeholders across the globe to collectively build a prosperous and socially inclusive future that respects the environment (Sachs et al., 2023).

Sustainability transition (ST) research, which stems from technology and innovation studies, is a field broadly recognised in decision-making for sustainable development (IPCC, 2023). The field seeks to advance sustainability by understanding the transformations of large-scale societal sectors (Köhler et al., 2019; Markard et al., 2012), recognising that current problems cannot be overcome through incremental improvements but instead require fundamental qualitative changes in socio-technical systems that fulfil societal functions (Loorbach et al., 2017). Consequently, STs involve complex changes that encompass multiple structures and elements of the socio-technical system, including stakeholders, norms, values, rules, technologies, and other material elements (Loorbach et al., 2017). A central aim of ST research is to increase our knowledge of the conditions under which such radical changes occur (Köhler et al., 2019; Markard et al., 2012), as well as the effective governance and management strategies that can accelerate STs (Kemp and Loorbach, 2003; Shove and Walker, 2007; Smith et al., 2005). As such, ST research and the SDGs both share the notion that change is complex and interdependent, suggesting that a systems perspective is necessary to advance sustainability at large.

Over the past two decades, ST research has seen rapid growth in publication output and citations (Hansmeier et al., 2021; Köhler et al., 2019). The field has gained recognition in significant policy and practice arenas (e.g., IPCC reports), clearly shaping how sustainability transitions are understood and pursued. Additionally, the discursive use of SDGs has increased considerably (Bogers et al., 2022). However, the scope and progress of real-world sustainable development have been insufficient. A recent report indicates that all 17 SDGs are globally off track and unlikely to be achieved within the designated timeframe (Sachs et al., 2023). Following this lack of progress, the capacity of academic research to contribute more broadly to sustainable development has been questioned (Confraria et al., 2024). Specifically, for ST research, concerns have been raised about the relevance and rigour of the work produced, casting doubt on the field's ability to accelerate STs and promote sustainable development as intended (Feola, 2020; Susur & Karakaya, 2021).

When reviewing current critiques, the field's research focus and potentially biased assumptions stand out as key concerns. This includes a primary focus on technological changes, often at the expense of broader social, political, and economic structures (Andersen & Geels, 2023; Geels et al., 2015; Stirling, 2019; Wolfram & Kienesberger, 2023). Additionally, there are calls to examine the conditions under which innovations are deployed. Several scholars, for instance, have emphasised the importance of studying the relationship between STs and contemporary societal structures, including the historical and global dynamics that significantly influence these structures. For example, Arora and Stirling (2023) see a need to assess the intersections of power and privilege within the context of colonialism in the field. Meanwhile, Wolfram and Kienesberger (2023) note the limited consideration of gender relations when analysing power, diversity, and justice within STs. Moreover, scholars have pointed out a geographical bias

within the ST field, with a predominant focus on European contexts (Arora & Stirling, 2023; Preuß et al., 2021). This focus risks transferring solutions from European to non-European settings, overlooking unique local challenges (Ghosh & Schot, 2019). Similarly, Susur and Karakaya (2021) have raised concerns about the lack of reflection on sustainability assumptions, sources of unsustainability, trade-offs, and impacts beyond individual studies. Feola (2020) identifies this lack of reflexivity as a significant barrier to achieving sustainable development. As a result, recommendations may fail to capture the complex interactions between socio-economic and ecological factors, as well as the diverse temporal dynamics, thereby limiting the potential impact of the field (Smith & Stirling, 2010; Sovacool, 2016).

This paper aims to examine whether current ST research priorities are sufficiently comprehensive and aligned with the sustainability challenges of our time. First, we propose a research framework to categorise current research outputs in relation to SDGs and different types of research impact. Next, we use systematic review methods to map and analyse the extensive body of empirical work in the ST field, showing how the field has addressed sustainability during its first two decades. Our paper makes three contributions: (1) We develop an analytical tool applicable beyond the ST field to help assess research priorities and advance sustainability. (2) We present a comprehensive analysis of 256 ST papers, identifying research priorities related to the SDGs, societal impact, and geographical distribution, and offering insights into how the ST field has addressed sustainability. (3) Based on these findings, we propose a research agenda and discuss how the ST field can address current blind spots and improve its ability to advance sustainable development in the future.

RESEARCH FRAMEWORK

The debate surrounding research impact is not new, and several definitions of research impact have been proposed (Penfield et al., 2014). What most of them have in common is a distinction between scholarly impact (i.e., academic contributions to the field and measures of academic relevance and rigour such as citations) and societal impact (i.e., impact beyond academia and measures reflecting societal relevance, reach and change) (Penfield et al., 2014).

In this paper, we seek to examine the ability of ST research to advance sustainability, thereby focusing on societal impact. Societal impact is complex and notoriously difficult to measure because it takes time for research to be translated into practice (Morton, 2015). The processes through which this happens are dynamic, and outcomes can be challenging to predict or context-dependent (Aguinis et al., 2019; Morton, 2015). To track research impact, several authors have proposed a multistage contributions approach, applying case study methods to track impact generation through different stages of the research lifecycle, starting with the research itself, then moving on to research uptake, research use and research outcomes (Morton, 2015; Penfield et al., 2014). While useful, this approach requires detailed data from all stages, which is difficult to obtain for large samples of already published research. Given the challenge of measuring societal impact, we propose focusing on the intended or desired impact by examining research priorities in the form of research topics and implications and recommendations provided by authors aimed at promoting sustainable development. While these are not the same as societal impact, they do offer insight into the field's priorities and the direction in which authors hope society will progress, as well as the type of impact they aim to generate through their work.



Figure 1. An overview of the research framework (adapted by the authors, based on Hourneaux Junior, 2021; Sandes-Guimarães & Hourneaux Junior, 2020; UN, 2023; Whittingham et al., 2023).

Along this line of thinking, other scholars have recognised the potential value of using the SDGs as a proxy for impact (Bebbington & Unerman, 2018; Hourneaux Junior, 2021; Leal Filho et al., 2018). The various approaches to mapping research output in relation to the SDGs range from work focusing only on papers that explicitly mention the term "sustainable development goal(s)" (Nakamura et al., 2019) to those applying query-based and machine-learning methods (Jayabalasingham et al., 2019; Wastl et al., 2020) or utilising SDG-related terms to analyse a data corpus (Whittingham et al., 2023). Building on the latter, we propose a research framework (see Figure 1) where the 17 SDGs and related search terms about their objectives (Hourneaux Junior, 2021; UN, 2023; Whittingham et al., 2023) are used in conjunction with six potential types of societal impact (Sandes-Guimarães & Hourneaux Junior, 2020). The framework builds on systematic literature review methods, enabling a detailed analysis of how research in a specific domain engages with the SDGs and how the field seeks to advance sustainability. In our approach, the research context and key contribution of each article are identified, and based on this, the article is assigned one or more of the 17 SDGs. Going beyond just mapping research in relation to the SDGs, each paper is also assessed based on six possible types of impact, allowing for the classification of the article according to the societal value it seeks to achieve, whether economic, social, policy-oriented, organisational, cultural, or educational.

METHODOLOGY

To select the article corpus for our review, we followed best practices in the field (Chauhan et al., 2022; Secundo et al., 2020; Sengers et al., 2019; Snyder, 2019) and expanded upon the methodology proposed by Markard et al. (2012). This approach involves identifying important seed papers in the field and then searching for all the papers that reference at least one of these seed papers. In our case, we started by updating the original list of 20 seed papers with 20 additional ones, ensuring that we do not miss out on more recent developments in the field. We used the original search string (Markard et al., 2012) to identify papers in the Scopus database that mention one of the four foundational frameworks in the ST field (i.e., strategic niche management, technological innovation system, multi-level perspective, and transition management). After updating the list of seed papers, we proceeded to identify empirical papers that cite at least one of these 40 seed papers. To better target the search, we also included sustainability-related terms (e.g., "environmental" or "green"), transition-related terms (e.g., "sociotechnical" or "transformation"), and methodology-related terms (e.g., "case*") in the search string. We limited the sample to include only peer-reviewed articles published in English between 2002 and 2022. The time window of the search was set to begin in the year identified by Markard et al. (2012) as the publication date of the first article on STs. We decided to include only peer-reviewed papers, primarily to ensure high quality, relying on the academic process of double-blind reviews, as well as our evaluation of publication quality. Table 1 summarises the review protocol, outlining the progression from the initial database search to the final sample of 256 articles.

Following the database search, we further filtered the sample. We included all articles published in prominent journals in the ST field (*Environmental Innovation and Societal Transitions*, *Research Policy*, *Technological Forecasting and Social Change*, *Energy Policy*, and *Technology Analysis & Strategic Management*), as previously identified by Zolfagharian et al. (2019). Aligned with Brundin et al. (2022), publications from other journals were included if the outlet ranked three or higher on the Chartered Association of Business Schools (ABS) list. After applying these selection criteria, the dataset comprised 590 potentially relevant papers.

Table 1. Systematic review protocol for sample selection.

STEP	DESCRIPTION	OUTPUT
Step 1: Identify seed papers	In the first step, we updated the original list of 20 seed papers by Markard et al. (2012) by adding 20 new papers. For the search, we used the original search procedure in Scopus and extended the timeline. SEARCH STRING: Any document that contains the following terms in the title, abstract or keywords: (“strategic niche management” OR “technological innovation system” OR “technological system” OR “multi-level perspective” OR “transition management”) LIMIT TO: Document type: Article Language: English Date: 2012-2022	40 seed papers
Step 2: Identify review sample	In the second step, we identified all publications that cite at least one seed paper and align with ST-related keywords. SEARCH STRING: Any document that references one of the 40 seed papers and contains the following terms in the title, abstract or keywords: (sustainab* OR environmental* OR bio* OR renewable OR socio-technical) AND (transition OR transform* OR “system innovation” OR “radical innovation” OR shift OR change) AND (case*) LIMIT TO: Document type: Article Language: English Date: 2002-2022	2021 articles
Step 3: Filter results	In the third step, we narrowed down the sample by using quality filters, i.e. we only included publications from high-quality journals or key sustainability transition journals as identified by Zolfagharian et al. (2019). LIMIT TO: (ABS 4*, 4 and 3 journals) OR (Energy Policy, Environmental Innovation and Societal Transitions, Technology Analysis and Strategic Management)	590 articles
Step 4: Abstract review	In the fourth step, each abstract was independently reviewed by two authors, and any discrepancies were discussed to refine the inclusion and exclusion criteria. As a result, we limited the sample to publications meeting the following criteria: (1) Explicit mention of sustainability, grand challenge, or climate change in title, abstract or keywords (2) Addressed societal sector(s) can be identified in title, abstract or keywords (3) Abstract suggests that the article is empirical	282 articles
Step 5: Full paper review and coding	In the fifth and final step, each article was reviewed fully to verify its suitability for the review and code key characteristics. The authors engaged in regular discussions throughout the review process to discuss emerging themes and compare insights. The sample was further narrowed down by ensuring each article met the following criteria: (1) Article has implications for practice or provides recommendations (2) Article is empirical with a clear case context (i.e., conceptual papers with illustrative cases are removed from the final sample)	256 articles

In the next step, all three authors screened the first 20 abstracts to develop initial inclusion and exclusion criteria for the abstract review. After determining the review criteria (as outlined in Table 1), we divided the sample so that each abstract would be screened independently by two authors. As such, each author screened 2/3 of the 590 potentially relevant articles to assess their relevance to the aim of this systematic literature review. We evaluated the interrater reliability by keeping each evaluation private before a subsequent discussion, and we performed Krippendorff's alpha test (Hayes & Krippendorff, 2007) as a measure of interrater reliability. The test among the three authors yielded results with acceptable interrater reliability (e.g., $\alpha = 0.692$, $\alpha = 0.616$, $\alpha = 0.767$), thereby enhancing the robustness of our assessment. Whenever inconsistencies emerged in the classifications made by two of the authors, the matter was deliberated on collectively by all three authors until consensus was reached. After the abstract review, 282 articles remained in the sample. In the final step, we reviewed the full papers, coding them according to key characteristics, such as theoretical foundations, research methods, case locations and societal sectors. We also coded each article according to the SDG(s) to which it contributed and the type of impact(s) it sought to make. Applying our research framework, we utilised the complete list of all SDG indicators¹ and Whittingham et al.'s (2023) single-word terms for each SDG, allowing the creation of auto-alphacoding queries to search the whole content of each paper and verify our manual coding. Additionally, Sandes-Guimarães and Hourneaux Junior's (2020) impact categories served as guidelines for classifying the intended impact, as expressed by the authors through concrete research implications and recommendations. It is important to note that a paper can be related to more than one SDG or impact type, and the SDGs were mostly implicit in the text. For example, Bjerkan and Seter's (2021) article on shore power in Norway contributes to the development of sustainable and resilient infrastructure (SDG 9) and simultaneously promotes investment in cleaner energy technologies (SDG 7). Based on the authors' concrete policy recommendations, their paper can be classified as having a main impact on public policies. As with the abstract review, we held regular meetings throughout the coding phase to discuss our approach to classifying the SDGs and the impact types associated with the review sample. During the full paper review, we also removed articles that had no clear contribution or real-world case context. As a result, 256 articles remained in the final sample.

To analyse the final coded sample, we employed bibliometric methods (Broadus, 1987). This allowed us to identify sample characteristics regarding the number of citations, publication outlets, geographies, and research contexts, generating an overview of the frequencies of addressed SDGs and impact types. Building on this information, we conducted a co-citation analysis to explore the relationships between the SDGs further as they appeared in the review sample. This method allowed us to identify which SDGs were frequently cited together, suggesting thematic connections within the field. The outcome of this analysis was visualised through a co-citation network, which graphically represented these connections (Baker et al., 2020). Subsequently, we applied network analysis measures, such as degree centrality and network density, to the co-citation data (Donthu et al., 2021). This analysis provided a quantitative assessment of the SDGs' centrality and the overall interconnectedness within the network of reviewed papers. These insights facilitated a more nuanced synthesis of the ST field's research priorities and engagement with the SDGs, allowing for the development of our research agenda.

¹ The full list of indicators for each SDG is available at <https://unstats.un.org/sdgs/indicators/indicators-list/>.

RESULTS

Next, we present the results of our review, moving from descriptive characteristics of the sample to insights about the ST field's research priorities and its ways to approach sustainable development.

Descriptive characteristics: ST research across time, journals and geographies

The final ST research sample consisted of 256 peer-reviewed articles. In line with previous ST literature reviews (cf. Hansmeier et al., 2021; Markard et al., 2012), an overall increase in the number of case studies was observed between 2002 and 2022 (see Figure 2), indicating a growing interest in ST research and active engagement among scholars in the field.



Figure 2. Number of publications per year between 2000 and 2022.

A closer look at the distribution of papers across different peer-reviewed journals (see Figure 3) showed that the largest share of articles was published by *Environmental Innovations & Societal Transitions*, the home journal of the Sustainability Transitions Researcher Network (STRN). The next three on the list were *Technological Forecasting & Social Change*, *Energy Policy*, and *Research Policy*, all prominent transition journals, as specified by Zolfagharian et al. (2019).

As highlighted in Figure 4, the research contexts were spread out across 58 countries. There were 343 cases in the Global North compared to 52 cases in the Global South, indicating a significant geographical and cultural concentration. The United States (US) was the most frequently cited research context, with 44 papers, followed by European countries, including the United Kingdom (UK), the Netherlands, and Spain, which tied with 37 cases each, and Germany, featured in 28 articles. Among the Nordic countries, Sweden and Norway were frequently referenced, with 20 and 14 papers, respectively, whereas Denmark and Finland were cited as case study locations in 10 and 11 articles, respectively. Other nations, such as Australia and China, had comparable representations, with 15 and 14 papers, followed by Italy and

Canada, which had 10 and 8 publications, respectively. Emerging economies from the Global South only appeared once in the top 15 most common case study locations, represented by India in 8 papers. Kenya was the second most studied country in the Global South, with four publications, followed by Chile, Brazil, and Mexico, each with three case studies.

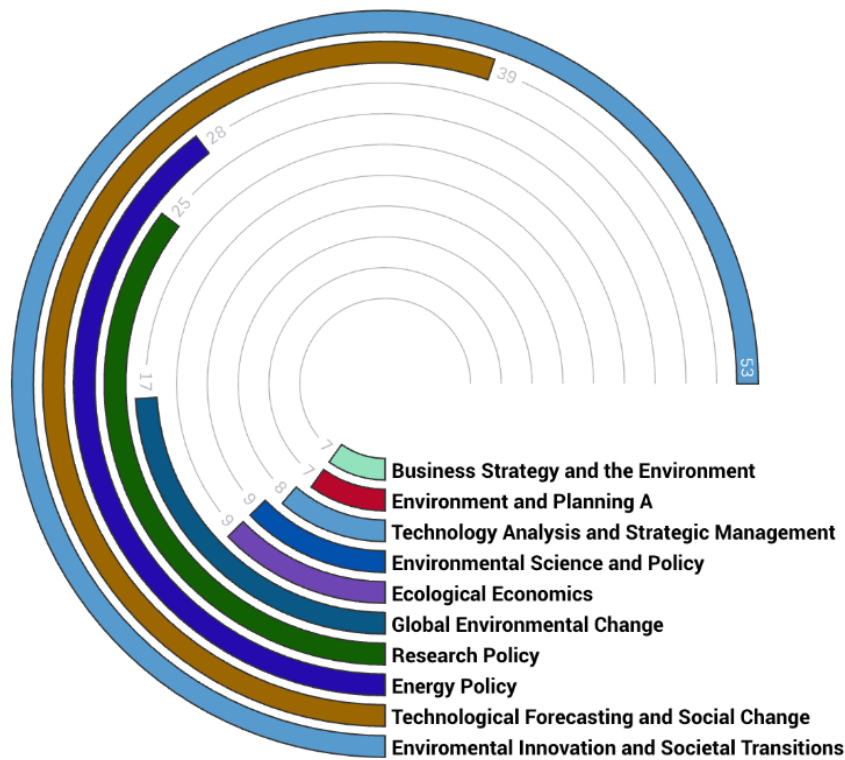


Figure 3. Top 10 publication outlets in the reviewed sample.

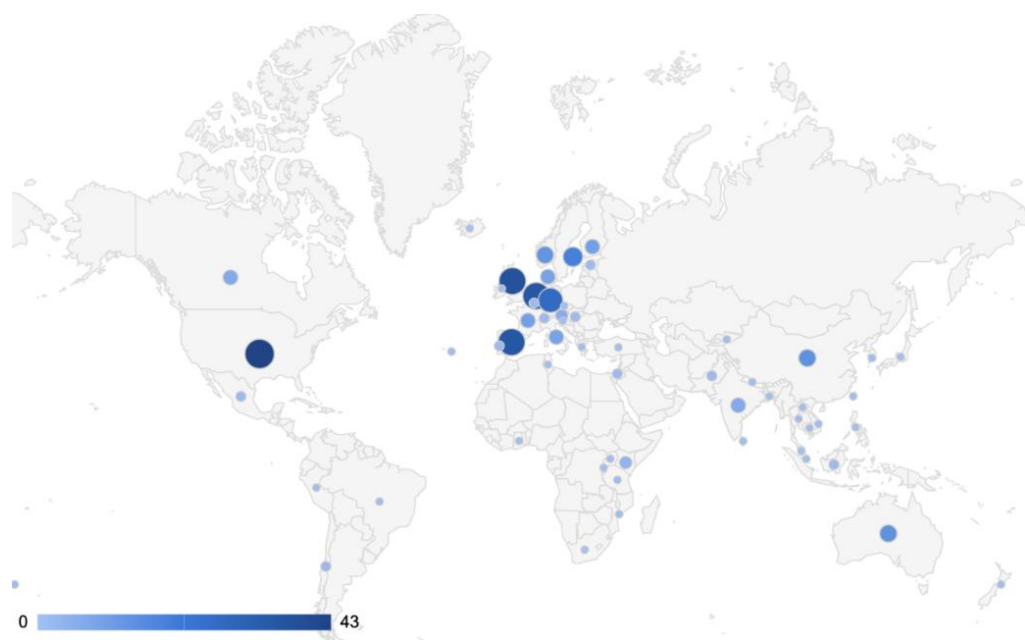


Figure 4. Geographical distribution of research.

Advancing sustainable development through ST research: Field priorities

Moving on to insights about addressed SDGs and types of impact, our analysis revealed a highly uneven distribution, reflecting the technology and policy-oriented nature of ST research.

In terms of research topics, Figure 5 illustrates a clear emphasis on topics related to industry, energy, cities, and sustainable production and consumption, with significantly less attention paid to issues such as poverty, health, education and gender equality. Moreover, this remains the case when grouping addressed SDGs geographically to distinguish between case contexts in the Global North and the Global South. While similar goals are prioritised across geographies, Figure 6 illustrates a significant discrepancy in the volume of papers. SDGs 7, 9, and 11 are the most commonly addressed topics in both the Global North and the Global South contexts; however, the corresponding numbers of articles are 83, 103, and 74 in the Global North and 17, 17, and 12 in the Global South, respectively.

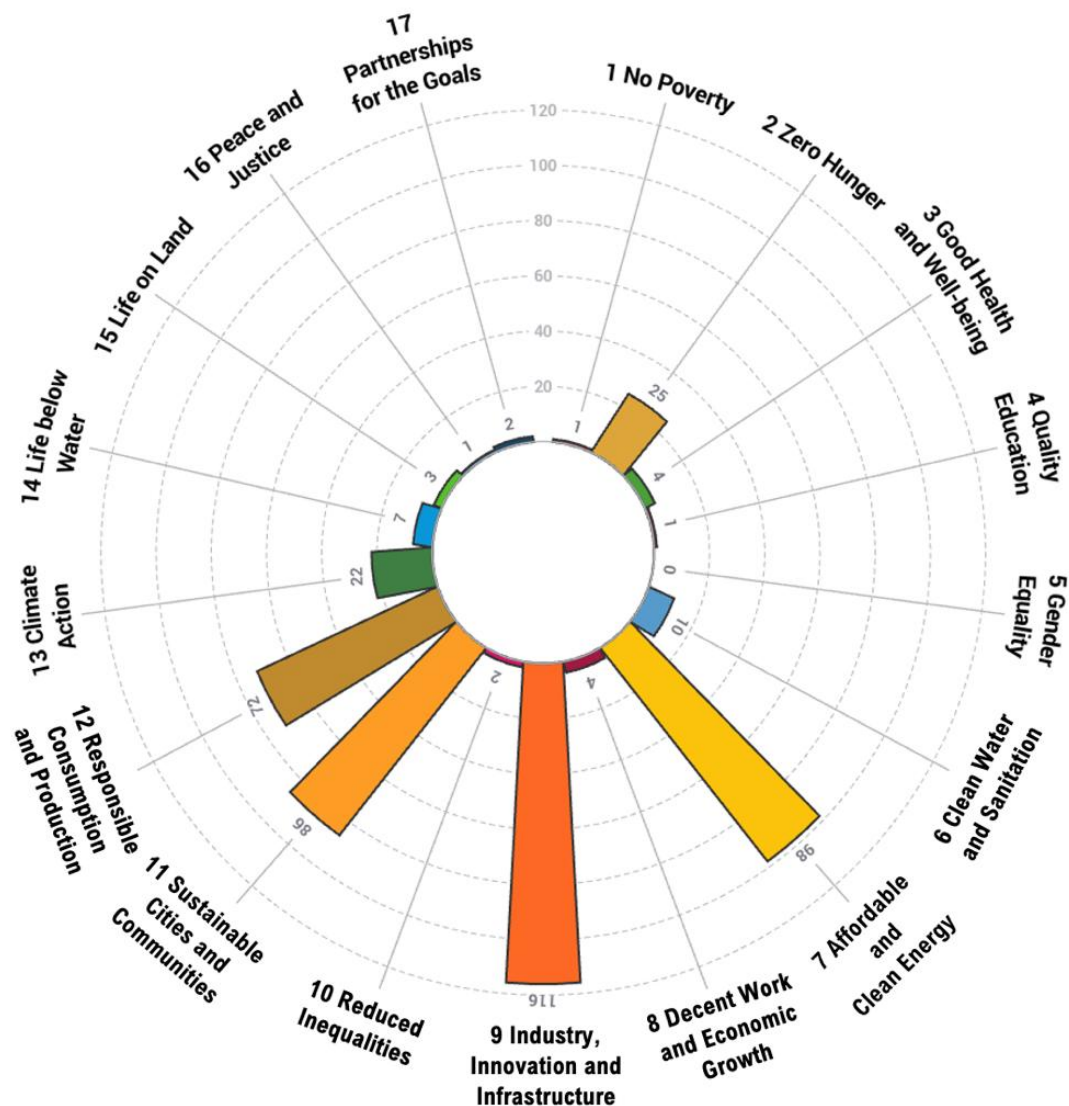


Figure 5. SDGs addressed in the review sample.

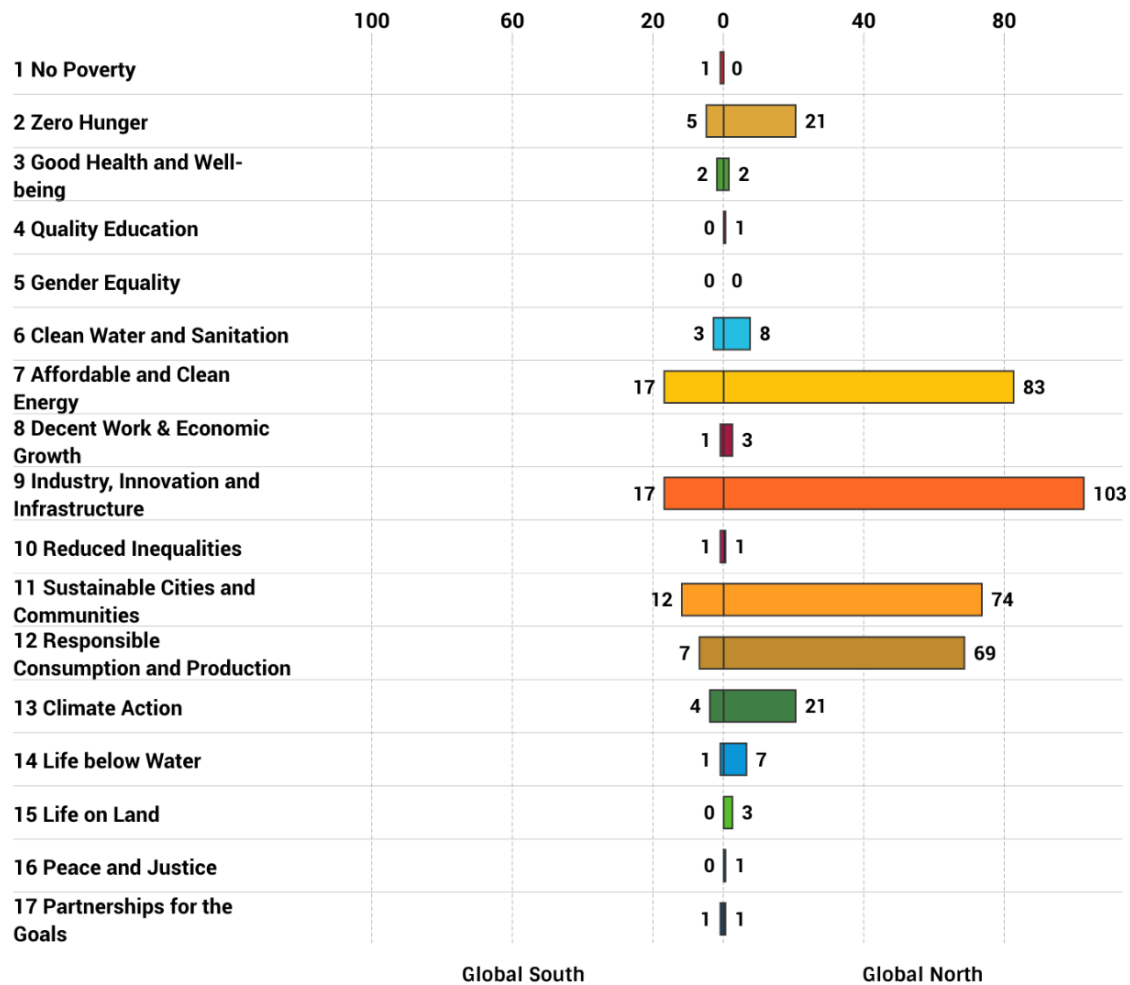


Figure 6. Grouping the SDGs addressed in the review sample under the categories of the Global North and the Global South.

Similarly, examining different types of impact, more than half of the reviewed articles aimed to influence public policies, indicating that scholars in the ST research field most commonly provide specific policy recommendations and discuss the implications of their research for governing STs. As illustrated in Figure 7, organisational impact was also prominently featured in the reviewed articles, whereas economic, social, cultural and educational impacts received much less attention.

To showcase some examples of commonly addressed topics, Bohnsack et al. (2014) have studied sustainable industrialisation by exploring the evolution of business models for electric vehicles. In their article, they highlight the adjustment of business practices toward service-based components to overcome market entry barriers. Similarly, the study by Lee and Hess (2019) focused on infrastructure development and energy policy, addressing the policy conflicts associated with the expansion of distributed solar energy infrastructure. Also addressing energy policy, Martiskainen et al. (2021) compared the experiences from the heat pump transition in Finland and the UK, underscoring the importance of user mobilisation in achieving a successful transition, thus informing strategies to enhance energy efficiency and the uptake of renewable energy technologies in domestic heating systems. Several articles

addressing the sustainability of cities focused on how grassroots projects by civil society groups could help transform urban infrastructure for sustainability and decarbonise the existing building stock, specifically through the promotion and integration of renewable energy systems (cf. Aylett, 2013; Brown & Vergragt, 2008; Hargreaves et al., 2013; Smith et al., 2016). Moreover, prominent examples of articles addressing sustainable consumption and production include Bocken et al.'s (2018) article about strategies for adopting circular business models; Martin et al.'s (2015) article of grassroots organisations within the sharing economy; and Simoens et al.'s (2022) study on resistance against reusable food packaging in Germany. Examples of less commonly featured topics include research on how to increase the capacity of communities and cities to adapt to climate-related hazards and natural disasters (cf. Brown et al., 2013; Burch, 2010; Shaw et al., 2014), how to advance the implementation of integrated water resource management through social learning (Colvin et al., 2014), how universities can support knowledge spillovers to strengthen regional entrepreneurial ecosystems (Wagner et al., 2021), and how to advance protection of marine and coastal ecosystems (Ayers & Kittinger, 2014; Galaz et al., 2012).

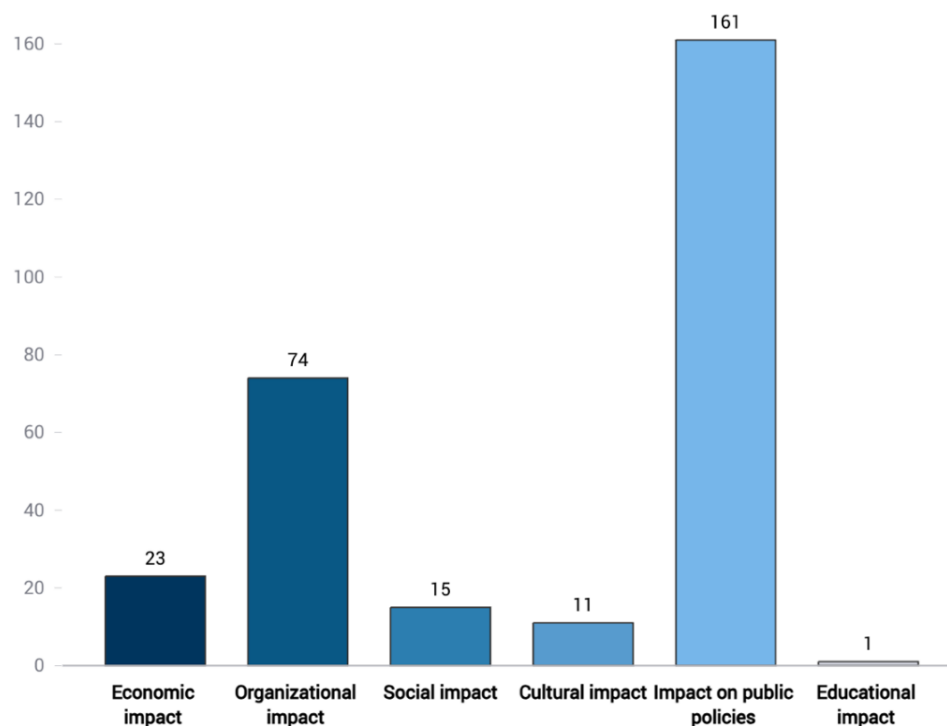


Figure 7. Impact types in the review sample.

As the above findings and examples show, many articles address more than one topic, indicating some degree of connection, especially between the different SDGs. Figure 8 illustrates the results of our co-citation analysis, which aims to capture the strength of these connections. Each node represents one SDG, with the size of the node corresponding to its degree centrality in our sample of academic papers. In the context of this study, degree centrality indicates the number of connections that a node has with others, signifying how often one SDG is co-addressed with other SDGs. Therefore, the lines connecting the nodes denote instances of SDGs being addressed concurrently within individual papers and the network map,

thus highlighting the interlinkages between different SDGs addressed in ST research. The network analysis underscores the disparity in co-mentioning SDGs in the reviewed papers. SDG 11 (Sustainable Cities and Communities) leads with a centrality of 15, followed by SDG 9 (Industry, Innovation and Infrastructure) and SDG 7 (Affordable and Clean Energy), with centrality values of 12 and 10, respectively. Notably, a contrast is observed between the degree of centrality in the network analysis and the frequency of SDG mentions in the reviewed sample. While SDGs 11, 9, and 7 rank highest in centrality, indicating their high interconnectedness with other SDGs, their frequency of mention is not proportionally high. This suggests that while certain SDGs are recognised as interconnected and often addressed together with other goals (Horvath et al., 2022), they may not be the primary focus of research as often as their degree of centrality implies. SDGs 1 (No Poverty), 3 (Good Health and Well-being), and 4 (Quality Education) exhibit the lowest centrality with a score of 1, highlighting their isolated treatment and suggesting the non-integration of less central SDGs in the sample. The network's overall density of 0.37 indicates a moderate level of interconnectedness among the SDGs in the sample, suggesting that while some of them are frequently addressed together, there is an opportunity for increasing integration across all SDGs. This finding is also highlighted by the network diameter of 4, indicating the presence of some distant connections among the SDGs in the network (Donthu et al., 2021).



Figure 8. Network overview of the co-citation analysis of SDGs in the reviewed sample. The node size is based on degree centrality.

DISCUSSION

Our systematic review showcases the ST field's research priorities in terms of addressed SDGs, geographical preferences, and intended impact. The identified priorities align with existing critiques and are somewhat expected, considering that ST research stems from technology and innovation studies, and the fields' foundational frameworks (i.e., strategic niche management, technological innovation system, multi-level perspective, and transition management) are inherently technology- and policy-oriented. The review, however, also reveals several important insights.

First, the geographical distribution of case studies in our ST research dataset reveals a distinct concentration in locations of the Global North, confirming the critique of a geographical bias in ST research as suggested by previous studies (Raven et al., 2012; Sengers et al., 2019). In terms of sustainable development and just STs, a primary challenge for countries in the Global North is managing their negative externalities (Tilsted et al., 2021). With this in mind, the low priority of environmental goals is concerning, and it may indicate that ST research still narrowly defines the boundaries of STs and their sustainability outcomes locally, failing to account for global interactions. Moreover, this suggests that a traditional growth paradigm still guides policy, practice, and academia, regardless of calls for action and a discursive emphasis on environmental goals, such as SDG 13 (Climate Action), in both corporate and political spheres (Heras-Saizarbitoria et al., 2022; Vinayavekhin et al., 2023).

For the Global South, our findings highlight prominent research examples such as urban mobility in Turkey (Canitez, 2019), the sanitation sector in Kenya (van Welie et al., 2018) and solar water heating in China (Huang, 2019). However, the Global South remains underrepresented. In our sample, the different SDGs exhibit a slightly more balanced distribution when examining studies in the Global South context, possibly reflecting the need to prioritise a broader range of goals to mitigate local vulnerabilities. However, upon examining the broader context, our review reveals little differentiation in the SDGs addressed by ST case studies across different regions. This could suggest the tendency in the ST field to prioritise topics typically associated with the Global North and subsequently apply these northern perspectives and solutions to the Global South without adequate consideration of their relevance or adaptability, thereby possibly failing to address the most pressing issues, such as limited access to clean water or food insecurity faced by the latter. Additionally, such uniformity in research focus will inadvertently risk oversight of the profound intersectionality of power dynamics, racialised patterns of discrimination, and enduring colonial histories that influence the realities of the Global South (Arora & Stirling, 2023). Lastly, the lack of focus on SDG 17 (Partnerships for the Goals) further underscores potential missed opportunities for collaborative and mutually beneficial research efforts to accelerate STs across regions.

Considering our findings against current SDG actions and goal prioritisation among scholars and practitioners, an interesting finding is that SDGs 1 (No Poverty) and 8 (Decent Work and Economic Growth), which are globally the most prioritised by countries in their action plans (Forestier & Kim, 2020), are under-represented in ST research. Logically, national prioritisation should be reflected in academic outputs, following funding and other means of influence. Our findings nonetheless show the opposite. The complex interconnections and dependencies between the goals are possible reasons for this mismatch. For example, Nerini et al.'s (2018) study highlights how one SDG underpins the achievement of all other SDGs and vice versa, suggesting that SDG 8 (Decent Work and Economic Growth), which is a national focus, is likely to progress when other socio-economic goals do, such as SDG 9 (Industry, Innovation and Infrastructure), which is strongly visible in research produced in the ST field.

Additionally, an analysis of the frequency of SDGs among the reviewed case studies reveals a notable concentration on goals related to technological aspects, such as SDG 9 (Industry, Innovation and Infrastructure), SDG 7 (Affordable and Clean Energy), and SDG 11 (Sustainable Cities and Communities). In line with previous concerns that researchers in the field tend to focus on technological innovation as the key driver of STs (Shove & Walker, 2010; Smith & Stirling, 2010; Sovacool, 2016; Stirling, 2011), our findings confirm a technocentric bias in ST research toward themes of technological innovation and low-carbon infrastructural development. However, the focus on SDG 12 (Responsible Consumption and Production) also indicates attention to sustainable consumption practices, reflecting a recognition of the importance of systemic change in both production and consumption patterns for sustainability (Markard et al., 2012).

The frequency (or lack thereof) with which crucial SDGs are addressed points to an area of concern. Despite the urgent issues such as high child mortalities, climate change adaptation, and primary education access, these topics seem relatively under-represented in the reviewed sample of ST research, as indicated by the lower frequency of publications relating to SDG 13 (Climate Action), SDG 3 (Good Health and Well-being), SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation), SDG 1 (No Poverty) and SDG 4 (Quality Education). Moreover, a notable blind spot is the lack of case studies addressing SDG 5 (Gender Equality), which echoes Wolfram and Kienesberger's (2023) findings that the influence of gender as a key factor in socio-technical change remains underexplored in ST research. Without a clear understanding of the gender dynamics at play in STs, interventions and policies designed to promote sustainable development may be less effective as they might not adequately account for the specific needs and vulnerabilities of different genders. In turn, this oversight may lead to unfair outcomes and perpetuate existing gender disparities.

Furthermore, our findings show that the types of impact that ST research aims to produce are predominantly focused on policy implications (Dunn et al., 2017; van Oosten et al., 2018; Werbeloff et al., 2016). This emphasis reflects an increased connection between transition thinking and established policy frameworks, indicating the field's recognition as a legitimate area of policy-oriented research (Loorbach et al., 2017). However, this policy-focused research impact tends to overshadow the importance of other impact areas, as the results reveal significantly fewer case studies addressing cultural and social impacts. These impact areas remain underrepresented despite the significant role social norms, cultural values, and related behaviour play in either hindering or bringing about action for STs. Even more striking is the almost complete absence of publications seeking educational impact. This shortage is particularly troubling, considering education has a pivotal role in shaping norms, attitudes, and awareness about urgent global issues.

While it is beyond the scope of this paper to search for concrete explanations for the discussed findings, it is worth noting that some of the uncovered gaps and shortcomings may partly be manifestations of the current academic journal, funding, and research evaluation systems (cf. Caniglia et al., 2021; Moyer & Hedden, 2020). The fact is that journal articles are framed by factors beyond authors' priorities, assumptions, and preferences. For example, the predominant focus on policy impact among the reviewed ST case studies might be related to the fact that publishing in the types of reputable journals included in this review requires scholars to formulate concrete policy recommendations (e.g., *Research Policy* or *Energy Policy*). Thus, reinforcing the practice and leading scholars to further prioritise research that aligns with high-impact policy areas to the detriment of equally important yet less immediately influential areas,

such as cultural and educational impacts. Over time, these tendencies can become self-reinforcing, shaping the direction and focus of whole research fields.

Overall, our findings show that ST research continues to focus on socio-technical transitions in large societal sectors, suggesting that although the field theoretically acknowledges the complexity of change, research outputs do not adequately reflect this complexity. Consequently, the field risks limiting its ability to advance sustainability on a broader scale (Forestier & Kim, 2020; Goyeneche, 2022; Heras-Saizarbitoria et al., 2022; Kim, 2023). To reach its transformative potential, the ST field needs to adopt a more holistic approach to sustainable development that encompasses the technological, social, environmental, and economic aspects of development, embracing complexity rather than reducing it.

TOWARDS A RESEARCH AGENDA

Based on the preceding discussion, we offer a research agenda to address the identified gaps and challenges that may limit the ST field's ability to advance sustainable development. The principle of indivisibility is a central concept that emerges as a unifying theme for future research, setting up its capacity for sustainable development. In this context, indivisibility is understood as the recognition of (1) the intricate interconnectedness among diverse geographical, cultural, economic, and environmental factors that shape STs; (2) the premise that elements of sustainable development cannot be fruitfully addressed in isolation; (3) the inseparable link between technological change and social practice change, both intertwined with (4) the sociocultural context in which these transitions occur; and (5) the relation between the context in which research knowledge output is produced and its potential to contribute to sustainable development. Each of these points is elaborated below.

First, future studies should acknowledge that relevant problems and solutions in the Global North context are often not feasible in the Global South. Therefore, we recommend greater reflexivity and critical thinking in ST research, as some SDGs and research impacts may not apply to the same extent in the Global South context. Moreover, our review reveals that ST studies published in top-ranking journals are mainly conducted by researchers from or living in the Global North. The lenses used are those from the North, even in cases where the South is studied (e.g., impacts on public policies through recommendations are almost exclusively formulated for democratic governance systems). Thus, the sociocultural context in which these ST studies are carried out is disconnected from the context in which the research knowledge output is produced. To reduce this gap, we encourage future research teams to be formed by authors from countries with different levels of development, thereby simultaneously strengthening the partnership and cooperation needed to achieve SDG 17, which is currently lacking in our review.

Second, recognising the overemphasis on technological innovation themes in the reviewed ST case studies, we encourage future work to embrace thematic areas related to a broader array of SDGs, such as those focusing on health, hunger, poverty, education, and particularly gender equality. There is a pressing need to diversify the thematic areas explored in ST studies to include under-represented SDGs. In this regard, future studies should recognise and address the interconnected nature of the SDGs more explicitly. This strategy implies focusing beyond isolated sustainable development objectives. Instead, it calls for integrated, systemic perspectives that align with the interrelated nature of the SDGs—a fundamental principle in the ST field. Such an approach will allow researchers to capture the synergies and trade-offs across multiple goals.

Third, as we move forward, the scope of the impacts addressed in ST studies should extend beyond policy influence and technology. Such research should aim to understand and explain how social norms, cultural values, and related behaviours can either bring about or hinder sustainable development, as well as the tensions that may arise between achieving technological change and social practice change. As an article in our sample states, STs not only depend on policy changes and technological innovation but also involve transformations among individuals, groups, existing institutions, and mental models (Brown & Vergragt, 2008). We particularly call for more studies investigating the educational impact of ST, given its pivotal role in shaping sustainability norms, attitudes, and awareness, thus acting as a lever for STs.

Fourth, there is an urgent need for more case studies examining the role of gender and intersectionality in STs that can further our understanding of the indivisible nature of social structures and sustainable development. Research should strive to gain knowledge about the specific needs, vulnerabilities, and influences of different genders and intersecting identities on STs. SDG 5 (Gender Equality), which is currently under-represented in the literature, should be emphasised.

To better comprehend the capacity of ST literature to contribute to sustainable development, it is essential to assess the inextricable relationship between the field's research output and the context in which it is produced. Thus, for our final point, we encourage the ST community to critically examine the influence of current academic publishing and funding systems on the thematic foci of research and their societal impact. Investigating how the pressure to publish and the requirement to generate policy-relevant outcomes might lead to an overemphasis on specific topics and a neglect of important areas, such as cultural and educational impacts, could provide valuable insights. This would involve examining how the academic system shapes research priorities and developing alternative models to alleviate potential associated pressures and biases.

CONCLUSION

In conclusion, this paper presents a more nuanced perspective on the societal relevance of ST research by highlighting how its research output, in relation to the SDGs, seeks to advance sustainability. At the same time, we uncover under-researched areas that demand a shift in focus to the principle of indivisibility. By constructing an original analytical tool that integrates SDGs and six potential types of societal impact, we also provide a robust framework that can be utilised as a proxy for assessing a scientific field's research priorities in relation to sustainable development, thereby contributing to advancing sustainability beyond the confines of the ST field.

Ending on a reflexivity note, as with any research endeavour, we must acknowledge that this systematic literature review is subject to some limitations that should be considered when interpreting its results. Despite our methodologically structured and rigorous approach, these limitations reflect the inherent complexity of systematically studying the relation between the scientific output and the advancement of sustainable development.

First, our study focused solely on the ST field, excluding other research streams dealing with sustainable development. While this was a deliberate choice, given the considerable size of the topic and the risk of being inundated with papers, it meant that our findings pertained primarily to the ST field and did not consider the full scope of sustainable development literature and its

potential relations with the SDGs. Future studies could mitigate this limitation by employing a similar research design, incorporating, for instance, automated text-mining techniques. It would then be possible to explore not only the ST field but a wider range of sustainable development literature and to investigate how these fields influence one another, overlap, and are differentiated.

Second, our analysis neither considered the potential negative impacts of the scientific knowledge output of the ST field on the SDGs nor accounted for any possible adverse spillover effects on the SDGs. The omission of these elements might result in an incomplete understanding of the overall impact of ST research on the SDGs. Further studies could aim to explore these negative influences to provide a more comprehensive picture of the field.

The last limitation lies in accepting the SDGs without critical examination. While they provide a comprehensive framework for assessing global development efforts, the SDGs may oversimplify complex socio-environmental issues, potentially leading to the overlooking of regional contexts and contradictions between goals. Despite these complexities, the SDGs provide broadly accepted and quantifiable metrics for assessing research capacity in support of sustainable development. Therefore, while recognising their inherent imperfections, we believe that the set of SDGs remains a valuable tool for analysing and comparing the contributions of different research fields to sustainability objectives.

Despite these drawbacks, we believe that our review offers valuable insights into the current thematic blind spots that may limit the ST field's ability to promote sustainable development. We hope that our findings and proposed research agenda can foster a more targeted, impactful, and nuanced knowledge output for ST research, ultimately increasing its ability to advance real-world sustainability objectives.

REFERENCES

- Aguinis, H., Ramani, R. S., Alabduljader, N., Bailey, J. R., & Lee, J. (2019). A pluralist conceptualization of scholarly impact in management education: Students as stakeholders. *Academy of Management Learning and Education*, 18(1).
- Andersen, A. D., & Geels, F. W. (2023). Multi-system dynamics and the speed of net-zero transitions: Identifying causal processes related to technologies, actors, and institutions. *Energy Research & Social Science*, 102, 103178.
- Arora, S., & Stirling, A. (2023). Colonial modernity and sustainability transitions: A conceptualisation in six dimensions. *Environmental Innovation and Societal Transitions*, 1(48), 100733.
- Aylett, A. (2013). Networked urban climate governance: neighborhood-scale residential solar energy systems and the example of Solarize Portland. *Environment and Planning C: Government and Policy*, 31(5), pp. 858–875.
- Ayers, A. L., & Kittinger, J. N. (2014). Emergence of co-management governance for Hawai'i coral reef fisheries. *Global Environmental Change*, 28, pp. 251–262.

- Baker, H. K., Pandey, N., Kumar, S., & Haldar, A. (2020). A bibliometric analysis of board diversity: Current status, development, and future research directions. *Journal of Business Research*, 108, pp. 232–246.
- Bebbington, J., & Unerman, J. (2018). Achieving the United Nations Sustainable Development Goals: An enabling role for accounting research. *Accounting, Auditing and Accountability Journal*, 31(1).
- Bjerkkan, K. Y., & Seter, H. (2021). Policy and politics in energy transitions. A case study on shore power in Oslo. *Energy Policy*, 153, 112259.
- Bocken, N. M., Schuit, C. S., & Kraaijenhagen, C. (2018). Experimenting with a circular business model: Lessons from eight cases. *Environmental Innovation and Societal Transitions*, 28, pp. 79–95.
- Bohnsack, R., Pinkse, J., & Kolk, A. (2014). Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles. *Research Policy*, 43(2), pp. 284–300.
- Bogers, M., Biermann, F., Kalfagianni, A., & Kim, R. E. (2022). Sustainable Development Goals fail to advance policy integration: A large-n text analysis of 159 international organizations. *Environmental Science & Policy*, 138, 134–145.
- Broadus, R. N. (1987). Toward a definition of “bibliometrics”. *Scientometrics*, 12, pp. 373–379.
- Brown, H. S., & Vergragt, P. J. (2008). Bounded socio-technical experiments as agents of systemic change: The case of a zero-energy residential building. *Technological Forecasting and Social Change*, 75(1), pp. 107–130.
- Brown, H. C. P., Smit, B., Somorin, O. A., Sonwa, D. J., & Ngana, F. (2013). Institutional perceptions, adaptive capacity and climate change response in a post-conflict country: a case study from Central African Republic. *Climate and Development*, 5(3), pp. 206–216.
- Brundin, E., Liu, F., & Cyron, T. (2022). Emotion in strategic management: A review and future research agenda. *Long Range Planning*, 55(4), 102144.
- Burch, S. (2010). Transforming barriers into enablers of action on climate change: Insights from three municipal case studies in British Columbia, Canada. *Global Environmental Change*, 20(2), pp. 287–297.
- Caniglia, G., Luederitz, C., von Wirth, T., Fazey, I., Martín-López, B., Hondrila, K., König, A., von Wehrden, H., Schäpke, N. A., Laubichler M. D., & Lang, D. J. (2021). A pluralistic and integrated approach to action-oriented knowledge for sustainability. *Nature Sustainability*, 4, pp. 93–100.
- Canitez, F. (2019). Pathways to sustainable urban mobility in developing megacities: A socio-technical transition perspective. *Technological Forecasting and Social Change*, 141, pp. 319–329.

- Chauhan, C., Parida, V., & Dhir, A. (2022). Linking circular economy and digitalisation technologies: A systematic literature review of past achievements and future promises. *Technological Forecasting and Social Change*, 177, 121508.
- Colvin, J., Blackmore, C., Chimbuya, S., Collins, K., Dent, M., Goss, J., Ison, R., Roggero, P. P., & Seddaiu, G. (2014). In search of systemic innovation for sustainable development: A design praxis emerging from a decade of social learning inquiry. *Research Policy*, 43, pp. 760–771.
- Confraria, H., Ciarli, T., & Noyons, E. (2024). Countries' research priorities in relation to the Sustainable Development Goals. *Research Policy*, 53(3), 104950.
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W.M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, pp. 285–296.
- Dunn, G., Brown, R. R., Bos, J. J., & Bakker, K. (2017). The role of science-policy interface in sustainable urban water transitions: Lessons from Rotterdam. *Environmental Science & Policy*, 73, pp. 71–79.
- Feola, G. (2020). Capitalism in sustainability transitions research: Time for a critical turn? *Environmental Innovation and Societal Transitions*, 35, pp. 241–250.
- Forestier, O., & Kim, R. E. (2020). Cherry-picking the Sustainable Development Goals: Goal prioritization by national governments and implications for global governance. *Sustainable Development*, 28, pp. 1269–1278.
- Galaz, V., Crona, B., Österblom, H., Olsson, P., & Folke, C. (2012). Polycentric systems and interacting planetary boundaries—Emerging governance of climate change—ocean acidification—marine biodiversity. *Ecological Economics*, 81, pp. 21–32.
- Geels, F. W., McMeekin, A., Mylan, J., & Southerton, D. (2015). A critical appraisal of Sustainable Consumption and Production research: The reformist, revolutionary and reconfiguration positions. *Global Environmental Change*, 34, pp. 1–12.
- Ghosh, B., & Schot, J. (2019). Towards a novel regime change framework: Studying mobility transitions in public transport regimes in an Indian megacity. *Energy Research & Social Science*, 51, pp. 82–95.
- Goyeneche, O. Y. R., Ramirez, M., Schot, J., & Arroyave, F. (2022). Mobilizing the transformative power of research for achieving the Sustainable Development Goals. *Research Policy*, 51(10), 104589.
- Hansmeier, H., Schiller, K., & Rogge, K. (2021). Towards methodological diversity in sustainability transitions research? Comparing recent developments (2016-2019) with the past (before 2016). *Environmental Innovation and Societal Transitions*, 38, pp.169–174.
- Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change*, 23(5), pp. 868–880.

- Hayes, A. F., & Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication methods and measures*, 1(1), 77–89.
- Heras-Saizarbitoria, I., Urbieto, L. & Boiral, O. (2022). Organizations' engagement with sustainable development goals: From cherry-picking to SDG-washing? *Corporate Social Responsibility and Environmental Management*, 29(2), pp. 316–328.
- Horvath, S. M., Muhr, M. M., Kirchner, M., Toth, W., Germann, V., Hundscheid, L., Vacik, H., Scherz, M., Kreiner, H., Fehr, F., Borgwardt, F., Gühnemann, A., Becsi, B., Schneeberger, A., & Gratzner, G. (2022). Handling a complex agenda: A review and assessment of methods to analyse SDG entity interactions. *Environmental Science & Policy*, 131, pp. 160–176.
- Hourneaux Junior, F. (2021). The research impact on management through the UN's sustainable development goals. *RAUSP Management Journal*, 56, pp.150–155.
- Huang, P. (2019). The verticality of policy mixes for sustainability transitions: A case study of solar water heating in China. *Research Policy*, 48(10), 103758.
- IPCC (2023). Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1–34.
- Jayabalasingham, B., Boverhof, R., Agnew, K., & Klein, L. (2019). Identifying research supporting the United Nations Sustainable Development Goals. Elsevier Data Repository, V1, doi: 10.17632/87txkw7khs.1.
- Kemp, R. & Loorbach, D. (2003). Governance for sustainability through transition management. In Open Meeting of Human Dimensions of Global Environmental Change Research Community, Montreal, Canada (Vol. 20).
- Kim, R. E. (2023). Augment the SDG indicator framework. *Environmental Science & Policy*, 142, pp. 62–67.
- Komiyama, H., & Takeuchi, K. (2006). Sustainability science: building a new discipline. *Sustainability Science*, 1(1), pp.1–6.
- Köhler, J., Geels, F.W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlemeier, M. S., Nykvist, B., Pel, B., Raven, R., Rohracher, H., Sandén, B., Schot, J., Sovacool, B., Turnheim, B., Welch, D., & Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, 31, pp. 1–32.
- Leal Filho, W., Azeiteiro, U., Alves, F., Pace, P., Mifsud, M., Brandli, L., Caeiro, S. S., & Disterheft, A. (2018). Reinvigorating the sustainable development research agenda: the role of the sustainable development goals (SDG). *International Journal of Sustainable Development and World Ecology*, 25(2).

- Lee, D., & Hess, D.J. (2019). Incumbent resistance and the solar transition: Changing opportunity structures and framing strategies. *Environmental Innovation and Societal Transitions*, 33, pp.183–195.
- Loorbach, D., Frantzeskaki, N., & Avelino, F. (2017). Sustainability transitions research: transforming science and practice for societal change. *Annual Review of Environment and Resources*, 42(1), pp. 599–626.
- Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research policy*, 41(6), 955–967.
- Martin, C. J., Upham, P., & Budd, L. (2015). Commercial orientation in grassroots social innovation: Insights from the sharing economy. *Ecological Economics*, 118, pp. 240–251.
- Martiskainen, M., Schot, J., & Sovacool, B. K. (2021). User innovation, niche construction and regime destabilization in heat pump transitions. *Environmental Innovation and Societal Transitions*, 39, pp. 119–140.
- Morton, S. (2015). Progressing research impact assessment: A “contributions” approach. *Research Evaluation*, 24(4).
- Moyer, J.D., & Hedden, S. (2020). Are we on the right path to achieve the sustainable development goals? *World Development*, 127, 104749.
- Nakamura, M., Pendlebury, D., Schnell, J., & Szomszor, M. (2019). Navigating the structure of research on sustainable development goals. *Policy*, 11, 12.
- Nerini, F. F., Tomei, J., To, L. S., Bisaga, I., Parikh, P., Black, M., Borrión, A., Spataru, C., Broto, V. C., Anandarajah, G., Milligan, B., & Mulugetta, Y. (2018). Mapping synergies and trade-offs between energy and the sustainable development goals. *Nature Energy*, 3, pp. 10–15.
- Penfield, T., Baker, M. J., Scoble, R., & Wykes, M. C. (2014). Assessment, evaluations, and definitions of research impact: A review. *Research Evaluation*, 23(1).
- Preuß, S., Galvin, R., Ghosh, B., & Dütschke, E. (2021). Diversity in transition: Is transitions research diverse (enough)? *Environmental Innovation and Societal Transitions*, 41, pp. 116–118.
- Raven, R., Schot, J., & Berkhout, F., (2012). Space and scale in socio-technical transitions. *Environmental Innovation and Societal Transitions*, 4, pp. 63–78.
- Sachs, J.D., Lafortune, G., Fuller, G., & Drumm, E. (2023). Implementing the SDG Stimulus. Sustainable Development Report 2023. Paris: SDSN, Dublin: Dublin University Press, 2023.
- Sandes-Guimarães, L.V.D., & Hourneaux Junior, F. (2020). Research impact—what is it, after all? Editorial Impact Series Part 1. *RAUSP Management Journal*, 55, pp.283–287.

- Secundo, G., Ndou, V., Del Vecchio, P., & De Pascale, G. (2020). Sustainable development, intellectual capital and technology policies: A structured literature review and future research agenda. *Technological Forecasting and Social Change*, 153, 119917.
- Sengers, F., Wieczorek, A. J., & Raven, R. (2019). Experimenting for sustainability transitions: A systematic literature review. *Technological Forecasting and Social Change*, 145, pp. 153–164.
- Shaw, A., Burch, S., Kristensen, F., Robinson, J., & Dale, A. (2014). Accelerating the sustainability transition: Exploring synergies between adaptation and mitigation in British Columbian communities. *Global Environmental Change*, 25(1), pp. 41–51.
- Shove, E., & Walker, G. (2007). CAUTION! Transitions ahead: politics, practice, and sustainable transition management. *Environment and Planning A*, 39(4), pp. 763–770.
- Shove, E., & Walker, G. (2010). Governing transitions in the sustainability of everyday life. *Research Policy*, 39(4), pp. 471–476.
- Simoens, M. C., Leipold, S., & Fuenfschilling, L. (2022). Locked in unsustainability: Understanding lock-ins and their interactions using the case of food packaging. *Environmental Innovation and Societal Transitions*, 45, pp. 14–29.
- Smith, A., Stirling, A., & Berkhout, F. (2005). The governance of sustainable sociotechnical transitions. *Research Policy*, 34(10), pp. 1491–1510.
- Smith, A., & Stirling, A. (2010). The politics of social-ecological resilience and sustainable socio-technical transitions. *Ecology and Society*, 15(1).
- Smith, A., Hargreaves, T., Hielscher, S., Martiskainen, M., & Seyfang, G. (2016). Making the most of community energies: Three perspectives on grassroots innovation. *Environment and Planning A*, 48(2), pp. 407–432.
- Sovacool, B. K. (2016). How long will it take? Conceptualizing the temporal dynamics of energy transitions. *Energy Research & Social Science*, 13, pp. 202–215.
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, pp. 333–339.
- Stirling, A. (2011). Pluralising progress: From integrative transitions to transformative diversity. *Environmental Innovation and Societal Transitions*, 1(1), pp. 82–88.
- Stirling, A. (2019). How deep is incumbency? A ‘configuring fields’ approach to redistributing and reorienting power in socio-material change. *Energy Research & Social Science*, 58, 101239.
- Susur, E., & Karakaya, E. (2021). A reflexive perspective for sustainability assumptions in transition studies. *Environmental Innovation and Societal Transitions*, 39, pp. 34–54.
- Tilsted, J. P., Bjørn, A., Majeau-Bettez, G., & Lund, J. F. (2021). Accounting matters: Revisiting claims of decoupling and genuine green growth in Nordic countries. *Ecological Economics*, 187, 107101.

- UN (December 31, 2015). Launch of new sustainable development agenda to guide development actions for the next 15 years. Available online: <https://www.un.org/sustainabledevelopment/blog/2015/12/launch-of-new-sustainable-development-agenda-to-guide-development-actions-for-the-next-15-years/> [Accessed February 28, 2025]
- UN (2023). Sustainable Development Goal indicators website. Available online at UN: <https://unstats.un.org/sdgs> [Accessed November 15, 2023]
- van Oosten, C., Uzamukunda, A., & Runhaar, H. (2018). Strategies for achieving environmental policy integration at the landscape level. A framework illustrated with an analysis of landscape governance in Rwanda. *Environmental Science & Policy*, 83, pp. 63–70.
- van Welie, M. J., Cherunya, P. C., Truffer, B., & Murphy, J. T. (2018). Analysing transition pathways in developing cities: The case of Nairobi's splintered sanitation regime. *Technological Forecasting and Social Change*, 137, pp. 259–271.
- Vinayavekhin, S., Li, F., Banerjee, A., & Caputo, A. (2023). The academic landscape of sustainability in management literature: Towards a more interdisciplinary research agenda. *Business Strategy and the Environment*, 32(8), pp. 5748–5784.
- Wagner, M., Schaltegger, S., Hansen, E. G., & Fichter, K. (2021). University-linked programmes for sustainable entrepreneurship and regional development: how and with what impact? *Small Business Economics*, 56(3), pp. 1141–1158.
- Wastl, J., Porter, S., Draux, H., Fane, B., Hook, D. (2020). Contextualizing sustainable development research. Digital Science. Report. <https://doi.org/10.6084/m9.figshare.12200081.v2>
- Werbeloff, L., Brown, R. R., & Loorbach, D. (2016). Pathways of system transformation: Strategic agency to support regime change. *Environmental Science & Policy*, 66, pp. 119–128.
- Whittingham, K. L., Earle, A. G., Leyva-de la Hiz, D. I., & Argiolas, A. (2023). The impact of the United Nations Sustainable Development Goals on corporate sustainability reporting. *Business Research Quarterly*, 26(1), pp. 45–61.
- Wolfram, M., & Kienesberger, M. (2023). Gender in Sustainability Transition Studies: Concepts, Blind Spots and Future Orientations. *Environmental Innovation and Societal Transitions*, 46.
- Zolfagharian, M., Walrave, B., Raven, R., & Romme, A. G. L. (2019). Studying transitions: Past, present, and future. *Research Policy*, 48(9), 103788.