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The Four-Pillar Intersectionality Framework: Reframing Sustainable Entrepreneurship as a Transdisciplinary Domain

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ABSTRACT

This study offers a comprehensive bibliometric and text-mining overview of two decades of sustainability-oriented entrepreneurship research. Drawing on 7563 peer-reviewed articles from the Web of Science Core Collection, we map the field's evolution, thematic structure, and disciplinary convergence, identifying influential authors, networks, and journals. Using rule-based classification and unsupervised learning, we categorize contributions within a four-pillar framework encompassing environmental, social, economic, and cultural dimensions and examine their prevalence, overlap, and temporal trends.

The results reveal a pronounced shift toward transdisciplinarity: 77% of articles engage with at least three pillars, and 34.5% address all four simultaneously. Building directly on this empirical evidence, we propose the Four-Pillar Intersectionality Framework (F-PIF), which reconceptualizes sustainable entrepreneurship as a transdisciplinary knowledge domain shaped by interdependent sustainability logics. The F-PIF is therefore both derived from and supported by the bibliometric findings, providing an empirically grounded conceptual model that advances theoretical understanding and offers practical guidance for scholars and practitioners navigating entrepreneurship in the age of sustainability.

1 | Introduction

The entrepreneurial response to sustainability challenges has become a central concern across disciplines, from management and economics to sociology, urban planning, and environmental studies (Luederitz et al. 2023; Abbas and Bulut 2024). As the United Nations Sustainable Development Goals (SDGs) call for systemic transitions, researchers have increasingly examined how entrepreneurship can foster social inclusion, environmental restoration, economic innovation, and broader sustainable development (Hall et al. 2010; George et al. 2016; Belz and Binder 2017; Sica et al. 2025). This growing interest has supported the rise of sustainable entrepreneurship (SE), an interdisciplinary field that investigates how entrepreneurial action generates value while addressing environmental and societal concerns (Dean and McMullen 2007; Muñoz and Cohen 2017; Lüdeke-Freund 2019). According to Cohen et al. (2008), SE involves identifying and exploiting opportunities that help resolve systemic sustainability problems through innovation, institutional change, and new forms of organizing. Schaltegger and Wagner (2011) define SE as a "business approach that creates economic value while simultaneously contributing to environmental protection and social well-being."

The sustainability discourse has long been shaped by Brundtland's (1987) definition of sustainable development and Elkington's (1997) Triple Bottom Line (TBL), which conceptualizes sustainability as the interplay of environmental, social, and economic objectives (Purvis et al. 2019). While influential, the TBL framework treats these pillars as additive

and omits culture, limiting its ability to capture the interdependent and multidimensional nature of sustainability challenges (Shepherd and Patzelt 2011; Hall et al. 2010). However, as sustainability challenges have become more systemic and context-dependent, there is a growing recognition among scholars for the adoption of models that go beyond the three-dimensional view of the TBL. This has led to new attention to culture as a fundamental, yet long-absent, dimension of sustainability.

Recent scholarship and policy initiatives have therefore argued for a fourth dimension: culture (Nguyen et al. 2020; Rosário et al. 2022). Culture shapes values, behaviors, and collective resilience, influencing whether sustainability strategies gain legitimacy and long-term traction (Hawkes 2001; UNESCO 2013).

When overlooked, even well-designed initiatives may fail. For example, eco-tourism projects in Indigenous regions have faltered when cultural values were overlooked. Conversely, creative enterprises that integrate heritage and identity into their models, such as those in rural Europe, often thrive by aligning economic innovation with community cohesion and ecological stewardship (Duxbury et al. 2012; McKeever et al. 2015; Daskalaki et al. 2015; Borin and Jolivet 2021; Palazzo et al. 2022). These cases underscore that culture is not a superficial layer but a structural dimension of sustainability.

However, SE research still treats culture as the "weakest link": it is often considered descriptively (as heritage, place, or identity) rather than analytically theorized. Critical perspectives from cultural policy (Kangas et al. 2018), paradox theory (Hahn et al. 2018), and corporate sustainability debates (Busch et al. 2023) highlight that culture also shapes power, legitimacy, and meaning in sustainability transitions. Building on these insights, we argue that culture must be understood as a constitutive logic alongside the economic, social, and environmental pillars.

Addressing this gap, the present study introduces the Four-Pillar Intersectionality Framework (F-PIF): a conceptual and analytical model that captures the interactions among environmental, social, economic, and cultural dimensions of sustainable entrepreneurship. Unlike additive approaches, the F-PIF emphasizes intersectionality, recognizing that sustainability logics shape one another and co-produce novel forms of knowledge, practice, and strategy. The framework is empirically grounded in a large-scale bibliometric and text-mining analysis of 7563 peer-reviewed articles (2005–2025), which demonstrates that SE scholarship has already moved beyond siloed approaches.

This study makes the following three contributions: (i) empirical: It provides the largest bibliometric and text-mining analysis of sustainability-oriented entrepreneurship to date; (ii) theoretical: It develops an empirically derived framework that reconceptualizes SE as a transdisciplinary domain, highlighting the neglected but constitutive role of culture; and (iii) practical/managerial: It offers actionable insights for entrepreneurs, policymakers, and educators on designing strategies, policies, and curricula that integrate all four sustainability dimensions.

2 | Research Questions and Main Aim of the Study

We situate our bibliometric and thematic analysis within the above-described four-pillar model, to provide an integrated view of how sustainability-oriented entrepreneurship research has developed across intersecting domains. In doing so, we contribute to a more nuanced and transdisciplinary understanding of the field's evolution and structure.

We are guided by the following research questions:

RQ1. *How has the volume and thematic distribution of sustainable entrepreneurship research evolved over the past two decades around the four pillars?*

RQ2. *To what extent do contributions reflect single-pillar, multi-pillar, or fully integrated sustainability approaches?*

RQ3. *What are the most suited journals, influential authors, patterns, main thematic areas, and clusters within this transdisciplinary field?*

RQ4. *What conceptual patterns emerge from the interaction among sustainability pillars, and how can these inform a more integrated understanding of sustainable entrepreneurship?*

To answer these questions, we start performing a bibliometric selection and screening of papers from the Web of Science (WoS) database and then analyze the final large sample of retrieved articles using rule-based unsupervised classification, text analysis, citation network mapping, and temporal trend modeling. Our contribution is both empirical and theoretical: in addition to visualizing and quantifying the evolution of the field cumulatively and separately for the four pillars, we introduce a new theoretical model, that we call the F-PIF, to interpret the observed convergence and overlap among sustainability logics.

3 | Methodology

We adopt a mixed-method bibliometric and computational text analysis approach to investigate the thematic and structural evolution of SE research. Our workflow follows PRISMA 2020 guidelines (Page et al. 2021) to select a final sample of papers from the WoS Core Collection and then combines rule-based keyword classification with unsupervised machine learning. The analysis was conducted using custom Python scripts using the libraries Pandas (data handling), NumPy (numerical computation; Harris et al. 2020), Matplotlib (visualization; Hunter 2007), Scikit-learn (unsupervised clustering; Pedregosa et al. 2011), and wordcloud (text visualization). The full workflow was executed in Jupyter notebooks to ensure reproducibility. Each stage of the analysis is described below.

From a methodological standpoint, our approach advances beyond standard bibliometric studies in two key ways, as further described in Section 2.2: (1) through an iterative keyword enrichment and classification protocol tailored for multidimensional sustainability analysis and (2) by combining this with

unsupervised clustering using interpretable, reproducible criteria.

3.1 | Sample Selection

The study builds on a systematic and replicable bibliometric protocol. Data were retrieved from the WoS Core Collection in June 2025 using an advanced query designed to capture literature at the intersection of sustainability and entrepreneurship. The WoS is the most comprehensive database of high-quality research in social sciences (Hicks and Wang 2011; Liu et al. 2024), hosting over 15,000 journals and more than 50 million records.

To ensure disciplinary relevance, we also restricted the dataset to sources categorized in a defined set of Web of Science Categories (WCs).

The initial search returned 10,068 records. Following the PRISMA protocol, we then applied three inclusion criteria: publication years between 2005 and 2025; English-language only; and document type limited to peer-reviewed journal articles. After screening, the final dataset consisted of 7563 articles. Figure 1 presents the PRISMA-like screening flow for database selection, inclusion criteria, and final sample. The exact search string is reported in the first block, while the inclusion criteria are instead listed in the second one.

In sum, this step produced a high-quality and thematically relevant corpus of 7563 peer-reviewed journal articles, which served as the foundation for the subsequent classification and text-mining analyses.

3.2 | Classification Into Sustainability Pillars

We began by constructing a keyword-based classification framework grounded in the following four sustainability dimensions: environmental, social, economic, and cultural. An initial set of semantically relevant keywords for each pillar was defined through expert judgment, literature reviews, and key policy documents (e.g., the SDGs, Agenda 21 for Culture, and UNESCO reports). To apply this framework, we created a composite textual field for each article by merging the title, abstract, author keywords, and Keywords Plus metadata. The text was preprocessed to remove both standard and domain-specific stopwords (e.g., "entrepreneurship," "development," "study") and converted to lowercase to standardize input. A rule-based matching pipeline then checked whether any pillar-specific keywords were present. Articles could be assigned to multiple pillars, enabling a multidimensional classification that reflects the integrative nature of sustainability research.

A key innovation in our methodology lies in the iterative keyword enrichment process designed to improve classification coverage and capture the evolving vocabulary of the field. Articles not initially matched to any pillar were labelled as "Unclassified." These were then subjected to frequency analysis to identify high-occurrence, nonstopword terms not already present in the dictionaries. Terms were contextually evaluated for semantic fit. For example, the term "placemaking," which emerged frequently in unclassified articles, was identified as conceptually aligned with the cultural pillar due to its strong association with identity, heritage, and place-based development. It was therefore added to the corresponding dictionary. Other terms identified in this process included

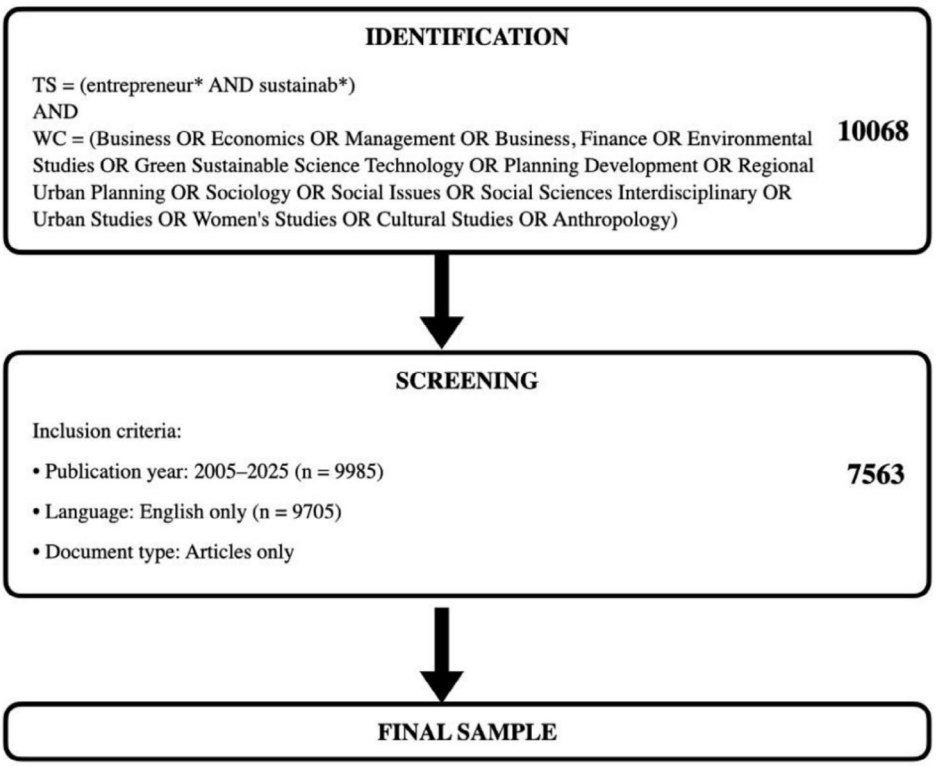

FIGURE 1 | Flow scheme for the selection of the final sample of articles from WoS, highlighting the main phases of identification and screening.

"resilience" (social), "remanufacturing" (environmental), and "stakeholder trust" (economic-social).

This enrichment loop was repeated until classification improvements plateaued, with fewer than one additional article classified per iteration. As a result, our final classification achieved near-complete coverage (99.9%), with only two unclassified articles out of 7563. The dynamic enrichment process ensures that our dictionaries are both empirically grounded and adaptive, making this approach particularly suited for interdisciplinary and evolving research domains like sustainable entrepreneurship. In summary, the classification procedure yielded a comprehensive, multidimensional dataset in which each article was associated with one or more sustainability pillars. This output provided the empirical basis for subsequent analyses of pillar overlap, temporal trends, and thematic clustering.

Following pillar classification, we performed a series of analyses. First, we computed the distribution of articles across single- and multipillar combinations using UpSet plots and combination frequency charts. Second, we examined the temporal evolution of pillar engagement and the geographic distribution of research based on first-author affiliations. Third, we analyzed co-authorship patterns using a citation-weighted network to identify key collaborative clusters. Fourth, we mapped journal–pillar contributions using bar charts, heatmaps, and Sankey diagrams to reveal disciplinary engagement trends.

To uncover latent thematic structures within each pillar, we then applied TF-IDF vectorization followed by K-means clustering. The optimal number of clusters was determined through a combination of the elbow method (based on within-cluster sum of squares), interpretability of themes, and cluster stability across random seeds. Final models included between 8 and 12 clusters per pillar, depending on content complexity. To validate clustering quality, we computed Silhouette Scores, which remained consistently above 0.6, and examined cosine similarity matrices to assess intracluster and intercluster cohesion.

Finally, we projected clusters onto a two-dimensional thematic map using the centrality-density framework (Cobo et al. 2011), which allowed us to distinguish between motor themes (central and dense), basic/transversal themes (central but sparse), niche topics (dense but isolated), and emerging areas (sparse and peripheral). This mapping was essential to visualize the evolving thematic architecture of the field and to theorize the growing integration across sustainability dimensions.

Overall, this stage generated a series of pillar-specific thematic maps and clusters that reveal both well-established and emerging research trajectories. These results were then used to interpret the structural and conceptual evolution of sustainable entrepreneurship research over the past two decades.

4 | Results

4.1 | Large-Scale Structure of Sustainable Entrepreneurship Research

In this section, we present the empirical findings derived from the bibliometric and thematic analysis of 7563 peer-reviewed articles on sustainability-oriented entrepreneurship. Through a combination of rule-based classification, network analysis, and unsupervised clustering, we aim to uncover the structural and semantic contours of a field that is increasingly characterized by multidimensional integration and transdisciplinary convergence.[1]

4.2 | Multidimensionality and Pillar Overlaps

This subsection examines the degree of overlap among sustainability pillars, with a particular focus on how many contributions engage with multiple dimensions simultaneously. The classification based on the four sustainability pillars reveals a high degree of multidimensionality in the literature.

Figure 2 shows an UpSet where the horizontal bars on the bottom-left indicate the total number of articles classified into

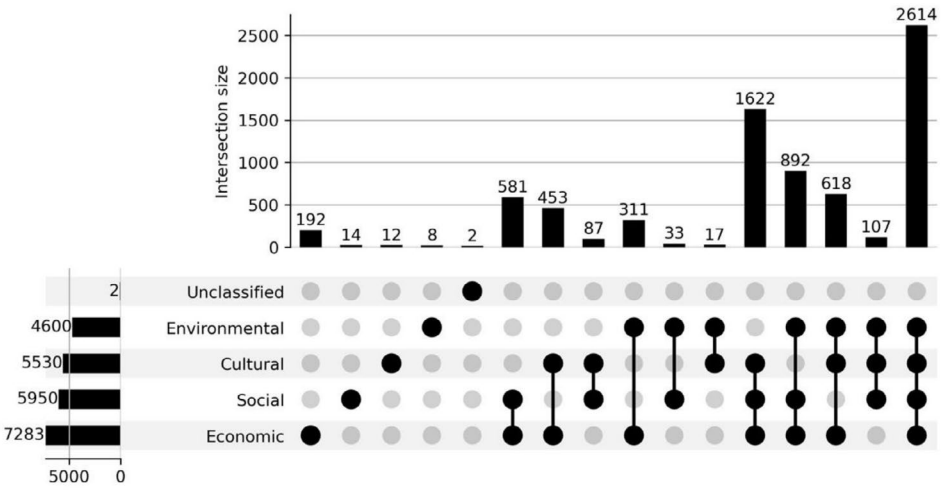

FIGURE 2 | UpSet Plot showing the distribution of 7563 articles across environmental, social, economic, and cultural dimensions. Horizontal bars indicate total articles per pillar, while vertical bars show the size of unique pillar combinations. Single-pillar studies are rare, whereas most contributions engage multiple dimensions, with 2614 articles addressing all four simultaneously, underscoring the strong multidimensional character of the field.

each individual pillar: economic (7283), social (5950), cultural (5530), and environmental (4600). The vertical bars at the top display the number of articles associated with each unique pillar combination, with filled circles below denoting the specific pillars involved. The most common configuration involves articles engaging with all four pillars simultaneously (2614 articles, representing the 34.5% of the full sample), followed by economic-social-cultural ($n = 1622$) and environmental-economic-social ($n = 892$), underscoring the field's increasing multidimensional orientation. Only a small fraction of articles belongs to a single pillar only, with the economic dimension emerging as the most frequent standalone category ($n = 192$), consistent with prior literature that has historically emphasized market-based perspectives on sustainability. This emphasis is evident in the way corporate sustainability research often underrepresents the social dimension; the Brundtland Commission's development policies heavily prioritize economic growth; and many theoretical sustainability frameworks are market-driven (Brundtland 1987; Peterson et al. 2025; Khalil 2025). Supporting this trend, a recent bibliometric study found that 41.5% of sustainability-related articles focus on the economic dimension, compared to 27.6% on the environmental and 19.0% on the social pillar (Hermosa del Vasto et al. 2024).

The strong overlap between pillars suggests that sustainability-focused entrepreneurship research increasingly operates across disciplinary and thematic boundaries, integrating social, ecological, economic, and cultural concerns in complex ways (Panwar et al. 2022). This pattern suggests that sustainability-oriented entrepreneurship research frequently spans multiple domains, rather than remaining confined to a single thematic pillar. This confirms that sustainable entrepreneurship scholarship has progressed beyond single-pillar perspectives, embracing a multidimensional logic where environmental, social, economic, and cultural factors increasingly interact in both theory and practice.

These overlapping configurations do more than illustrate bibliometric complexity: They signal a paradigmatic evolution in entrepreneurship research. The growing prevalence of multipillar studies reflects how entrepreneurs increasingly design ventures that integrate ecological regeneration, social value creation, and cultural legitimacy within viable business models. This trend resonates with recent work linking sustainability orientation to strategic governance and innovation practices (Velte 2024; Kaur et al. 2025), suggesting that transdisciplinary sustainability is becoming a central component of contemporary entrepreneurial strategy.

4.3 | Temporal Trends, Geographic Patterns, and Leading Authors and Journals

The production of papers per year is plotted for the four pillars in Figure 3. The field has grown substantially since 2005. The absolute number of articles shows a marked increase starting in 2013–2014, with the economic pillar always slightly above the other three pillars in terms of total production. This steady increase may reflect both a rising awareness of the SDGs and the mainstreaming of sustainability in entrepreneurship curricula and funding schemes.

The geographical analysis was obtained by counting the total number of papers by country, based on the national affiliation of the first author, retrieved from the "Address" column. Figure 4 shows a consistent leadership by England and China, across all four pillars. Italy, Germany, Spain, and India are also significant contributors, with subtle variations by pillar. For instance, Italy ranks high in environmental and cultural papers, while the social pillar shows more distributed international engagement.

At the same time, the analysis reveals a pronounced concentration of research activity in China and the United Kingdom. This imbalance reflects strong institutional and funding support in these countries but also indicates a potential conceptual bias toward Global North priorities. Expanding representation from Global South and Indigenous contexts will be vital to ensure that sustainable-entrepreneurship research captures diverse cultural and institutional realities.

These geographic patterns also mirror strategic priorities in sustainability policy and funding, where nations with established innovation ecosystems (e.g., China, the UK, and EU members) channel research and investment toward circular-economy and governance-based entrepreneurial strategies (Velte 2024). While these results highlight the global reach of sustainability-oriented entrepreneurship research, they also

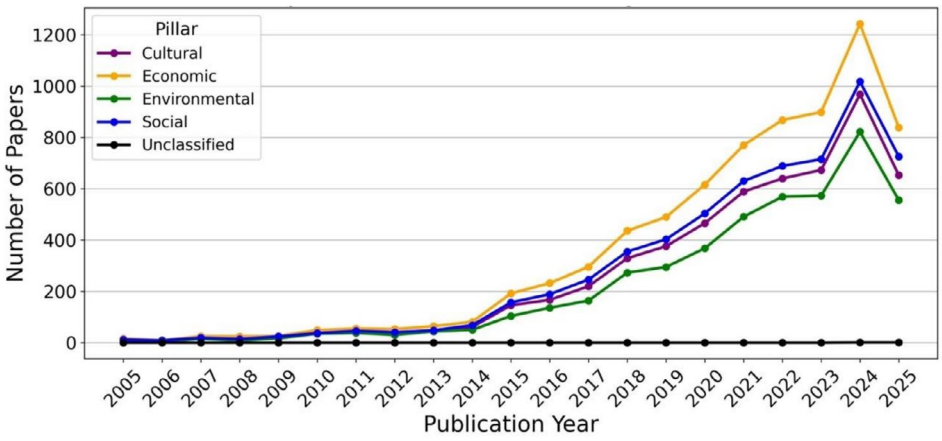

FIGURE 3 | Annual article counts (2005–2025) by sustainability pillar. The field shows continuous growth since 2013, with the economic pillar slightly leading in volume but all four dimensions rising in parallel.

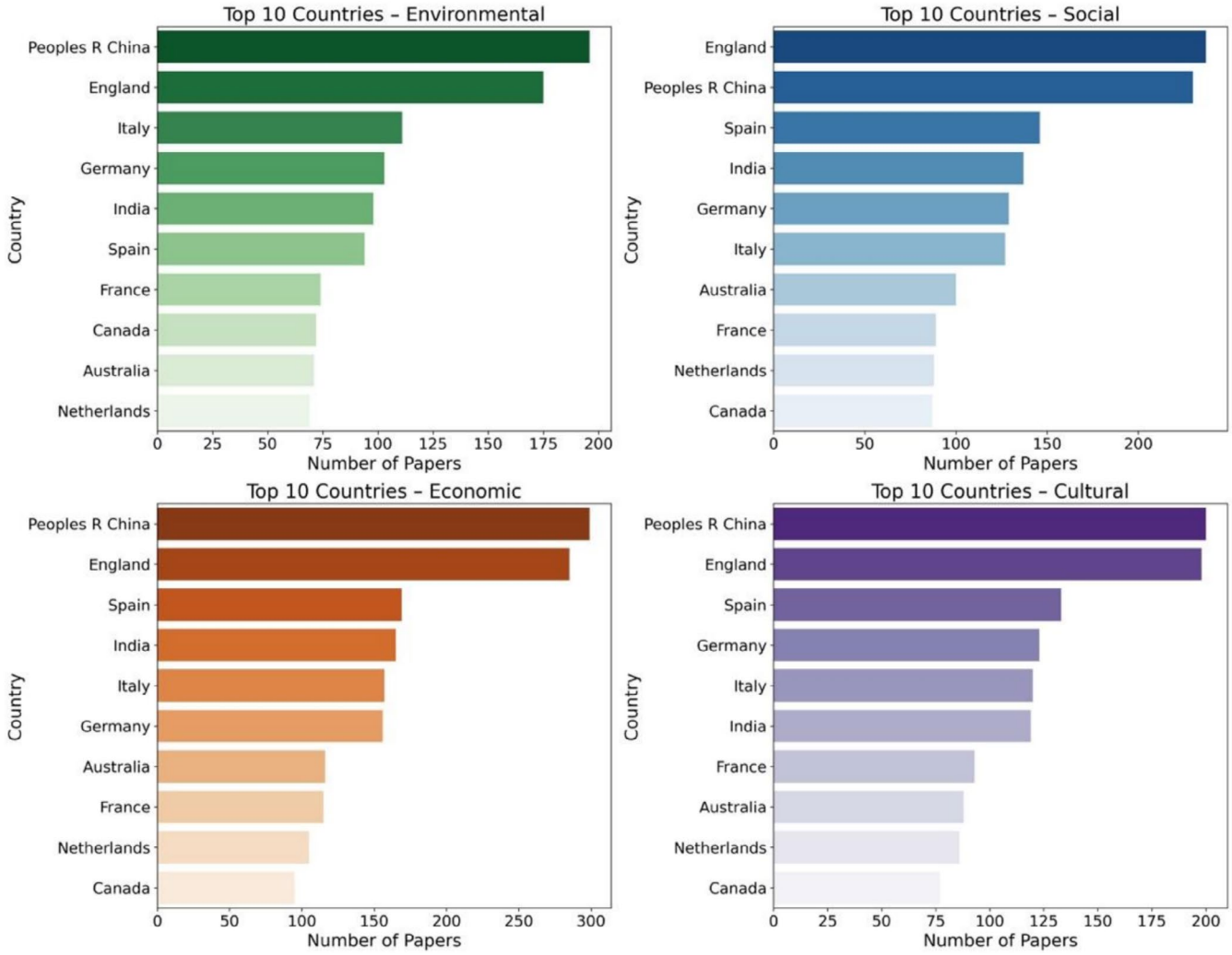

FIGURE 4 | Top 10 contributing countries by pillar, based on first-author affiliations.

point to a pronounced imbalance in knowledge production. The dominance of Chinese and UK-based authors reflects strong institutional and funding support in these regions but may also bias theoretical development toward Global North perspectives. This asymmetry underscores the need for greater inclusion of Global South and Indigenous scholarship to ensure that the conceptual evolution of sustainable entrepreneurship captures diverse socio-cultural contexts and epistemologies.

To identify the most influential contributions in the sustainability–entrepreneurship literature, we conducted a citation analysis using data on the number of citations (field: *Times Cited, All Databases*) (Yang et al. 2024). To account for recency bias, we normalized citation counts by the number of years since publication. Specifically, the total number of citations for each article was divided by the number of years elapsed since its publication year, yielding a *citations-per-year* metric. Articles published in the current or most recent year were normalized using a minimum denominator of 1 to avoid inflation. To assess pillar-specific impact, we exploded the pillar classification (as before, allowing multi-pillar assignments) and ranked the top five most cited articles within each sustainability dimension. A visualisation of the result of this analysis is provided in Figure 5.

Notably, several very recent papers (e.g., Fang et al. 2022; Yin and Yu 2022) and some of the papers appear in more than one pillar, as expected because we allow multiple associations.

For example, the article by Schot and Steinmueller (2018) emerges as the most cited in three of the four pillars (environmental, economic, and social), with more than 140 citations per year, underscoring its transdisciplinary resonance. Doubtless, this is the most influential recent paper produced on sustainable entrepreneurship. This foundational paper redefines innovation policy through three analytical lenses: research and development (R&D) support, systems of innovation, and transformative change. It emphasizes that conventional innovation strategies centered solely on economic competitiveness are insufficient to address systemic sustainability challenges. Instead, the authors advocate for a transformative approach that supports inclusive, mission-oriented transitions aligned with ecological and social goals. Although the paper does not focus narrowly on entrepreneurship, its impact on sustainability policy and innovation ecosystems places it at the center of debates on how entrepreneurial ecosystems should evolve. It fits within the environmental pillar due to its critique of current innovation systems and call for green transformation; within the economic pillar for its policy

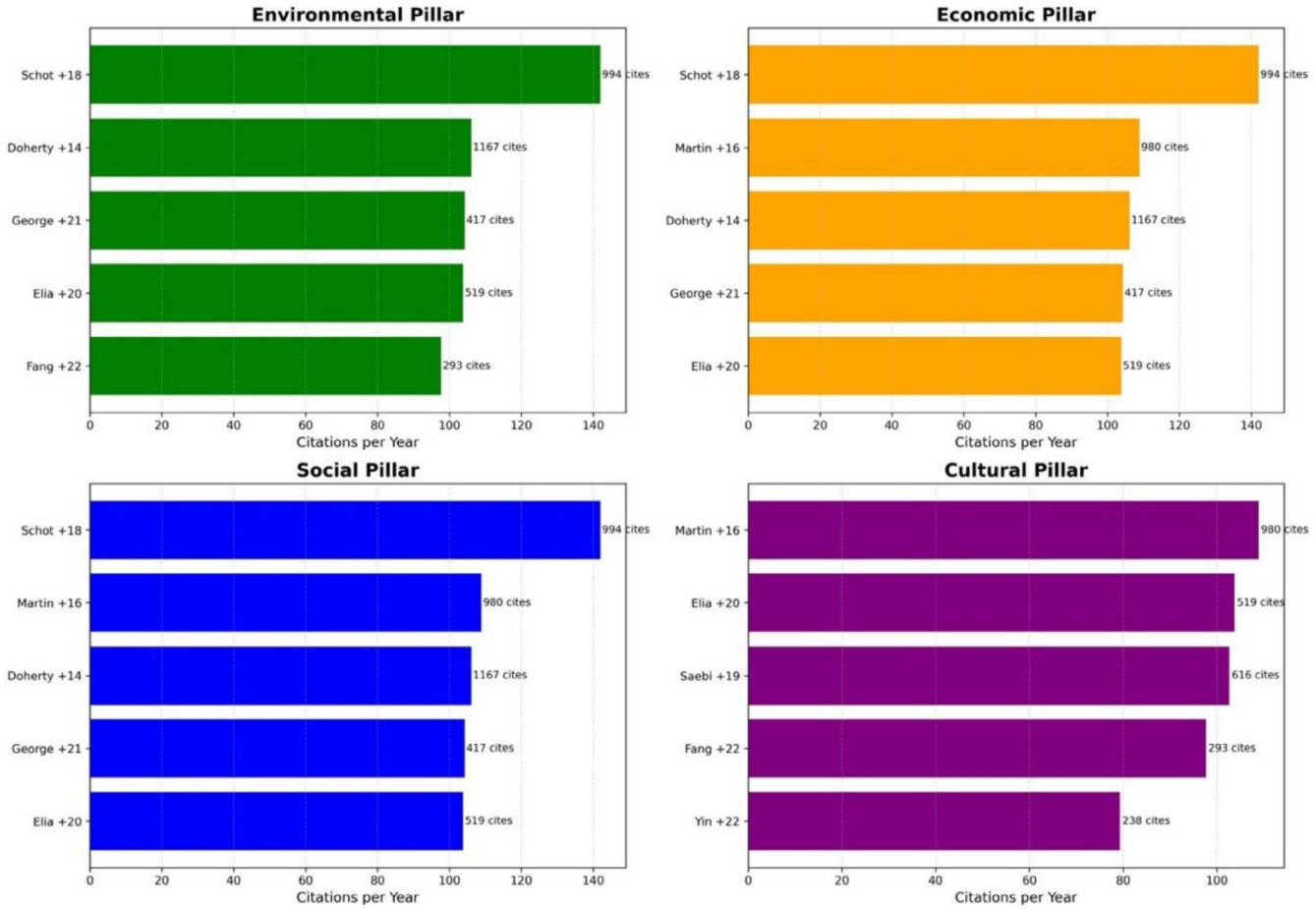

FIGURE 5 | Top five articles per pillar, ranked by normalized citation counts.

discussion on aligning R&D with long-term competitiveness and market creation; and within the social pillar through its emphasis on participation, inclusion, and directionality of change.

The only pillar not covered by the above-described paper is the cultural pillar, which is instead led by the article by Martin (2016). This article critically assesses the sustainability potential of the sharing economy. It highlights contradictions in platforms like Uber and Airbnb, which are often praised for their resource efficiency but criticized for labor precarity, displacement, and regulatory evasion. Martin argues that the sustainability discourse surrounding the sharing economy has often masked exploitative practices, and he calls for a values-driven rethinking of platform design and governance. Its emphasis on norms, meanings, and institutional critique makes it especially relevant to the cultural pillar, while its analysis of platform business models and market logics connects it to the economic dimension as well.

Finally, when considering instead the absolute citation counts, regardless of publication year, the most influential contribution in the field is that of Schaltegger and Wagner (2011): "Sustainable Entrepreneurship and Sustainability Innovation: Categories and Interactions," which has accumulated over 1170. This article provides a widely adopted typology of sustainability innovations and sustainable entrepreneurship. It defines SE as a form of business activity that creates economic value while addressing environmental and social problems and distinguishes between different types of sustainability innovation based on market orientation and value creation. The article fits within the environmental pillar, by linking entrepreneurial action to ecological performance improvements; within the economic pillar, by framing sustainability as a strategic opportunity for growth and market differentiation; and within the social pillar, through its acknowledgement of institutional and stakeholder pressures in shaping sustainability transitions. Together, these three highly cited papers exemplify the growing convergence of sustainability logics in entrepreneurship research.

The co-authorship network, which is plotted in Figure 6, highlights clusters of influential researchers. In the figure, each author is a node, interconnected with other authors with whom they have common publications. The color-coding indicates the total number of citations per author. The largest cluster is the central one, and it tends to align with prolific contributors in top-ranked journals who display high citation impact, such as *Li, Wang, Zhang*, and *Wu*. The structure suggests the existence of regional Chinese clusters, while some degree of fragmentation is found especially among European and Anglo-American authors.

Figure 7 shows a heatmap of the total number of papers published in a given journal per each pillar. Among the most prolific journals, Sustainability *(MDPI)* dominates, contributing a

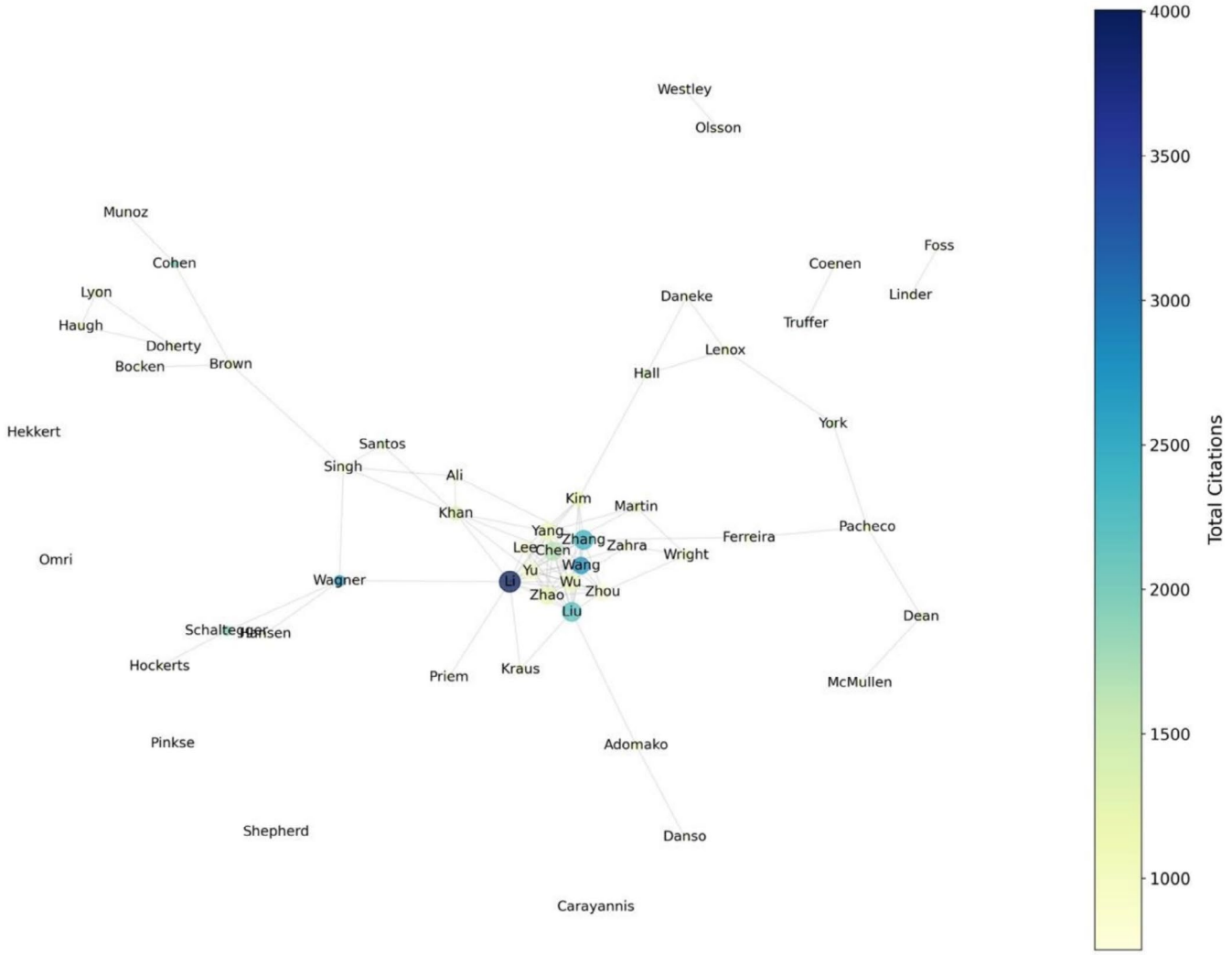

FIGURE 6 | Network map of authors (nodes) connected by co-publications, color-coded by total citation impact.

much larger number of articles than all other journals, across all four pillars (12.5% of the entire production for the cultural pillar, 17.3% for economic,10.8% for environmental and 14.3%). Among the 20 journals with the highest number of overall articles, all of them are present in all pillars, once again demonstrating the strong multidimensionality of the field, which is appreciated by the most influential journals. Overall, these findings depict a globally connected yet uneven field whose intellectual contours are shaped by the institutional and policy agendas of its most prolific regions.

4.4 | Keyword Patterns and Strategic Thematic Positioning

To uncover latent semantic structures within each sustainability pillar, we constructed word clouds and strategic maps based on the Term Frequency Inverse Document Frequency (TF-IDF) technique. The analysis followed a multi-step process. First, for each pillar, we extracted the full text content (titles, abstracts, and keywords) of all articles assigned to that dimension. We then applied a TF-IDF Vectorizer to transform the corpus into a high-dimensional term-document matrix, capturing the relative importance of terms within each pillar-specific sub corpus. In practice, the text is converted into a numerical representation, where each term is represented by a score that indicates its importance in the document relative to all documents.

We then visualized the top-ranking TF-IDF terms using the WordCloud package, with the font size of each word proportional to its relative TF-IDF weight within the pillar. The four clouds for the four pillars are provided in Figure 8 with the same colour code as in previous figures.

Interestingly, the term “growth” appears prominently in all four pillars, reflecting the central role of expansion and scaling across different dimensions of sustainability. While economic growth remains a dominant theme in entrepreneurship research, the term also appears in the context of green growth (environmental), inclusive or equitable growth (social), and growth in cultural engagement or identity (cultural). This suggests that the concept of growth is being reinterpreted across domains, not only as financial performance, but also as the scaling of impact, participation, or ecological regeneration.

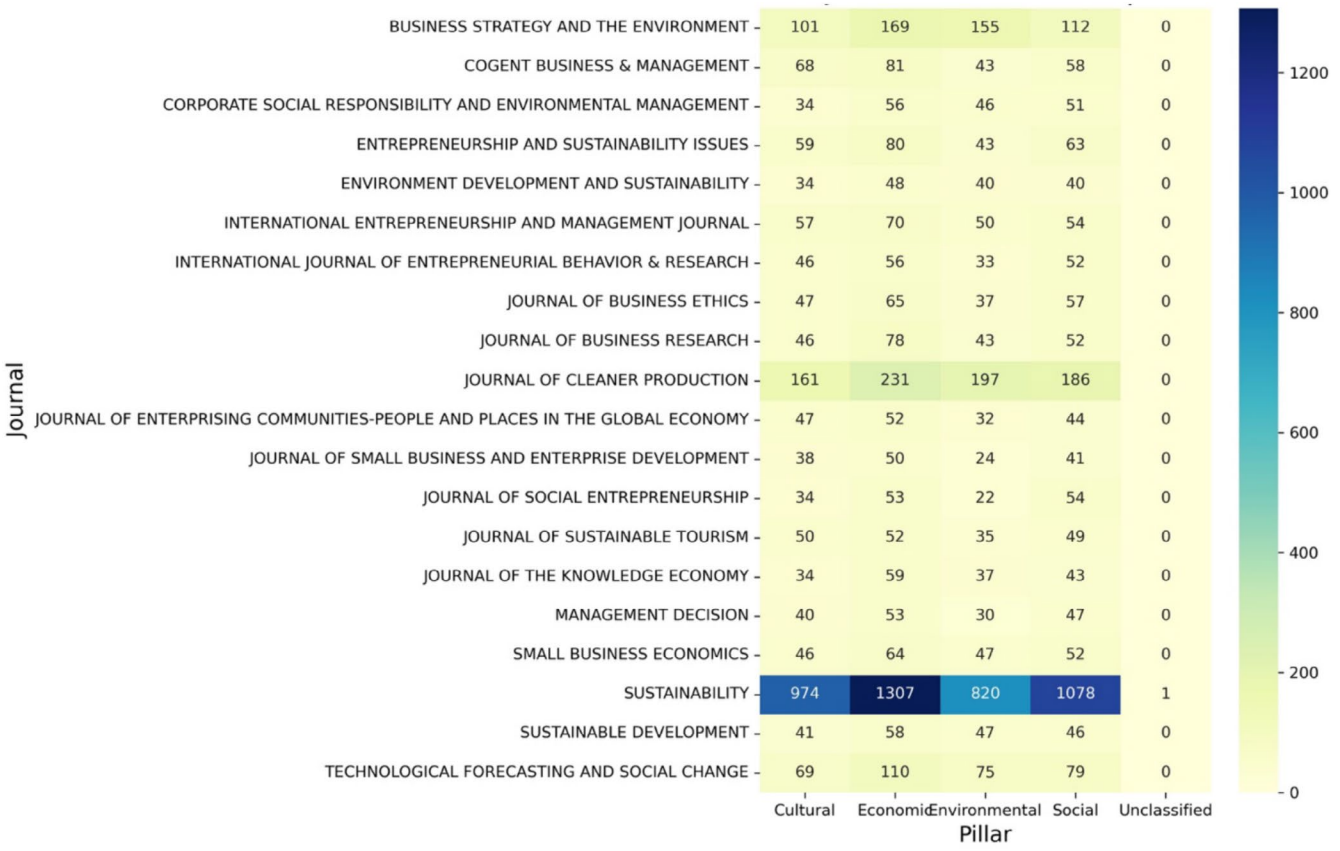

FIGURE 7 | Journal–Pillar Heatmap of the 20 most prolific journals, showing pillar-specific paper counts. Sustainability (MDPI) dominates across all pillars.

FIGURE 8 | Word clouds for each sustainability pillar based on TF-IDF analysis.

Likewise, the word "firm" appears prominently across the environmental, economic and social dimensions, indicating the centrality of organizational actors in sustainability discourse. Notable differences also emerge: "Ecosystem" and "environment" are dominant in the environmental pillar, reflecting concerns with ecological systems and transitions; "relationship" and "corporate" stand out in the social pillar, underscoring governance, inclusion, and responsibility themes; the economic pillar emphasizes "policy" and "market"; while the cultural pillar is distinguished by "education," "heritage," "identity," and "orientation." This latter is the most fragmented pillar, with many more but smaller words.

We subsequently applied unsupervised learning techniques to identify clusters of related documents. Using cosine similarity as the distance metric, we calculated intracluster and intercluster similarities to derive two key dimensions: density, measuring the internal cohesion of a cluster and centrality, representing the degree of connection to other clusters. At this point, a K-means clustering algorithm was used to organize documents into semantically coherent groups, and the mean TF-IDF scores of each cluster were used to extract representative keywords. The resulting thematic maps, shown in Figure 9, plot clusters along a two-dimensional plane with centrality on the x-axis and density on the y-axis (Cobo et al. 2011; Bamel et al. 2024). Centrality captures the extent to which a theme is connected to others (cross-cluster links), while density measures internal coherence among keywords within a cluster (intracluster similarity). Based on the values of centrality and density, themes are often classified into four different groups. Clusters in the upper-right quadrant represent well-developed and central research themes (motor themes), while those in the lower-left reflect emerging or marginal topics. Themes in the bottom right quadrant (basics) describe topics that are transversal to a discipline, although they are not central within a given domain. Finally, in the top left quadrant, we find themes with low centrality but high density. Hence, they do not influence other topics in other clusters but are central among researchers focusing on a given topic.

The environmental pillar, for example, shows strong centrality around "green innovation" and "environmental responsibility"; the social pillar is anchored in "social entrepreneurship" and "SMEs"; the economic pillar emphasizes "policy," "development," and "performance"; while the cultural pillar highlights "education," "place-making," and "creative identity."

These maps help delineate both established and emerging research trajectories and provide insight into the structural dynamics of sustainability scholarship within each thematic pillar. The maps also reinforce the notion that pillar boundaries are not well defined: For example, themes like "education" and "identity," typically associated with cultural sustainability, also appear near socially anchored clusters.

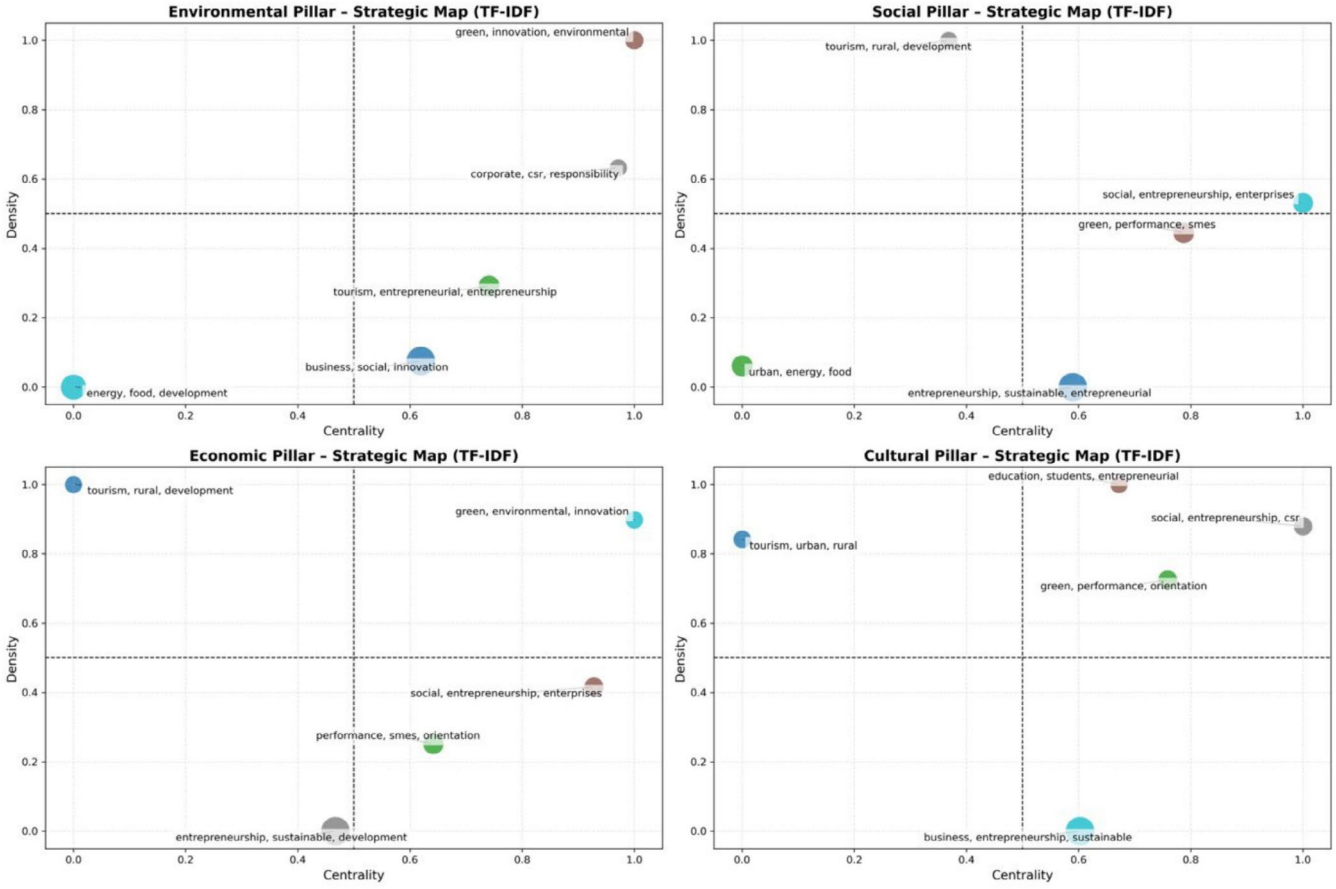

FIGURE 9 | Strategic thematic maps per sustainability pillar. Each bubble represents a thematic cluster, positioned by centrality (x-axis) and density (y-axis). Keywords indicate dominant terms per cluster. The maps show well-developed themes (e.g., green innovation, social entrepreneurship, policy/performance) and more fragmented cultural themes (education, heritage, identity).

Collectively, these thematic configurations portray a maturing domain in which sustainability is understood as an integrated system of interdependent logics. The coexistence of consolidated themes such as green innovation and social entrepreneurship with more emergent cultural and place-based clusters highlights the growing alignment of managerial, policy, and community perspectives within sustainable-entrepreneurship research.

Interpreted through a business-strategy lens, these thematic clusters reveal how sustainability has shifted from a peripheral concern to a core strategic logic. For instance, clusters around "green innovation," "policy," and "social entrepreneurship" indicate that firms increasingly embed sustainability within competitive and governance frameworks rather than treating it as an external constraint. Cultural themes such as "place-making" and "education" further illustrate how entrepreneurs mobilize identity and local knowledge as strategic resources. Together, these patterns highlight a movement toward purpose-driven, context-sensitive business models that align with the SDGs.

4.5 | Funding Landscape

To understand the institutional landscape supporting sustainability-oriented entrepreneurship research, we analyzed funding acknowledgments across the full dataset. Of the 7563 articles reviewed, 2924 papers (38.7%) explicitly acknowledged one or more funding sources, highlighting the critical role of public and institutional investment in shaping the contours of the field. Given the inconsistency in how funding agencies are recorded in bibliographic metadata, given the variations in spelling, abbreviations, and formatting, we applied a normalization strategy to consolidate aliases and harmonize funder names.

The results reveal a highly uneven distribution of funding activity. The National Natural Science Foundation of China (NSFC) emerges as the dominant source, supporting 325 publications, followed by the European Commission (153), UK Research and Innovation (UKRI, 112), and the Portuguese Foundation for Science and Technology (FCT, 98). North American agencies such as the U.S. National Science Foundation (NSF) and Canada's Social Sciences and Humanities Research Council (SSHRC) also play a visible role, as do regional initiatives including the European Regional Development Fund (ERDF) and the German Research Foundation (DFG). While most of these funders are national or supranational in scope, a number of institutional and mission-oriented funding bodies, such as FRFCU or Horizon 2020 programmes, also contribute meaningfully to the field's development.

In addition to their frequency, the thematic scope of funders varies considerably. Some agencies show broad engagement across multiple sustainability dimensions, while others concentrate on specific domains. For instance, NSFC is strongly associated with economic and technological research, reflecting China's policy emphasis on innovation-driven growth. The UKRI and the European Commission display more balanced support across environmental, economic, and social pillars. Other funders, such as SSHRC or DFG, appear less frequently and may focus more narrowly on disciplinary mandates or national priorities. These patterns suggest that research funding ecosystems reflect broader geopolitical, policy, and institutional orientations, influencing which sustainability challenges are prioritized and how entrepreneurship is framed in response.

Taken together, this analysis underscores that sustainable entrepreneurship is increasingly backed by global public funding, with clear signs of regional specialisation and strategic targeting. The consolidation of transnational and cross-pillar funding efforts also signals a shift toward more integrated and transdisciplinary approaches to sustainability, where entrepreneurial innovation is viewed not only as an economic driver, but also as a mechanism for ecological regeneration, social inclusion, and cultural preservation.

5 | Theoretical Framework: The F-PIF Transdisciplinary Model of Sustainable Entrepreneurship Knowledge

The results of the bibliometric analysis presented here suggest that research on sustainable entrepreneurship is not only multidimensional but also increasingly transdisciplinary. While earlier conceptualizations of sustainable entrepreneurship often followed the triple bottom line (Elkington 1997), more recent works highlight the rising relevance of a fourth pillar, that of cultural sustainability. This addition acknowledges the importance of heritage, identity, people, and place in shaping entrepreneurial agency and sustainable transformation.

The development of the F-PIF emerges directly from these empirical patterns. Specifically, the strong co-occurrence of the cultural pillar with both social and economic dimensions (see Figure 2) and the presence of clusters such as place-making, education, and creative identity (Figure 9) substantiate culture's role as a distinct and integrative sustainability dimension. Likewise, the high prevalence of multi-pillar combinations, where more than one-third of studies address all four pillars simultaneously, empirically supports the need to move beyond additive models toward an intersectional understanding of sustainability. These findings ground the F-PIF not as a post hoc conceptual addition, but as an analytical synthesis derived from the observed convergence of thematic and structural trends in the data.

Our results, which reveal a strong overlap among the four sustainability pillars (Sec.3.1), indicate a transdisciplinary convergence in the sustainable entrepreneurship literature over the past two decades. Instead of adhering to classical sustainability models that often prioritize one pillar above the others, the field displays a quadripartite, balanced, and overlapping system where knowledge circulates across multiple dimensions. These include economic logic, characterized by themes such as innovation, growth, and performance; social missions, encompassing justice, inclusion, and participation; environmental urgency, with a focus on climate, circularity, and regeneration; and cultural embeddedness, which relates to heritage, place, and meaning.

These results hence demonstrate that sustainable entrepreneurship is rarely treated as a siloed phenomenon; instead, most contributions adopt a cross-cutting perspective, especially across

economic, social, and cultural logics. To make sense of these findings, we introduce the F-PIF, a model that conceptualizes sustainable entrepreneurship as emerging from the interactions among these four interdependent and overlapping sustainability domains. Each pillar contributes distinct logics, values, and vocabularies, yet our analysis shows that the boundaries between them are increasingly blurred. In the proposed F-PIF model, shown in Figure 10 as the intersection of four circles, knowledge production is understood to occur in overlapping zones where sustainability dimensions interact. The bibliometric and clustering evidence demonstrates co-occurrence and thematic convergence among these pillars, which we interpret as indicative, though not conclusive, of more complex intersectional dynamics. Rather than treating the four dimensions as additive or hierarchically ordered, the framework theorizes how their interplay can foster the emergence of hybrid forms of knowledge, practice, and value.

While the F-PIF draws from interdisciplinary scholarship, its orientation is explicitly transdisciplinary. This means that it transcends disciplinary boundaries by engaging multiple forms of knowledge (academic, policy, and practical) to co-produce integrative understandings of sustainability that are both theoretically rigorous and socially relevant.

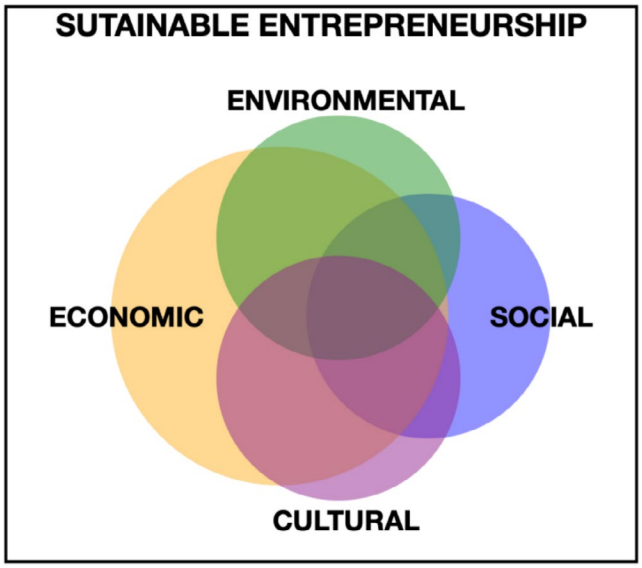

FIGURE 10 | F-PIF theoretical framework. The conceptual model illustrates how environmental, social, economic, and cultural logics intersect to shape sustainable entrepreneurship. The overlapping zones represent co-produced knowledge, hybrid practices, and integrated value narratives.

The term intersectionality is adapted here from its origins in critical and feminist theory, where it denotes the interdependent shaping of social categories such as gender, race, and class. In the context of sustainability and entrepreneurship, we use intersectionality in an analogous but domain-specific sense to describe the mutual shaping of environmental, social, economic, and cultural logics. This use does not replicate the identity-political meaning of the term but extends its analytical focus on relationality and co-constitution to sustainability systems and entrepreneurial practices. In this way, intersectionality serves as a conceptual bridge between the empirical co-occurrence observed in Section 3 and the theoretical proposition of co-constitution advanced in the F-PIF framework.

These intersections manifest across several layers of the scholarly ecosystem (Eller et al. 2020). At the thematic level, overlaps are particularly evident in contributions that explore hybrid initiatives, such as circular economy practices grounded in cultural heritage or driven by principles of social equity. These studies do not fit neatly within a single sustainability dimension but rather operate at the confluence of environmental, cultural, and social logics. Table 1 provides operational definitions and examples of the four sustainability pillars used in the study, illustrating how each dimension manifests conceptually and in practice.

This framework emphasizes several key dynamics. First, there is multi-level engagement: articles frequently address individual, organizational, and territorial dimensions simultaneously, reflecting a complex understanding of sustainability processes. Second, the framework highlights co-constitution, recognizing that the cultural and social pillars are not subordinate to the economic or environmental ones, but are instead mutually constitutive in shaping sustainability narratives. Third, it points to journal hybridization, as editorial orientations increasingly reflect and support transdisciplinary research. Many journals now adopt multidisciplinary scopes and actively encourage submissions that engage with multiple dimensions of sustainability. This shift is evident in the prominence of publications such as *Sustainability*, *Journal of Cleaner Production*, and *Business Strategy and the Environment*, all of which routinely feature work situated at the intersection of social, ecological, and economic domains. Finally, the framework underscores

TABLE 1 | Operational definitions and examples of the four sustainability pillars.

Pillar	Core definition	Themes/keywords	Example practices
Environmental	Ecological regeneration and responsible use of natural resources	Green innovation, circular economy, energy efficiency	Renewable-energy ventures, waste reduction initiatives
Social	Inclusion, equity, and community well-being	Social enterprise, participation, stakeholder trust	Inclusive employment models, community entrepreneurship
Economic	Viability, competitiveness, and long-term value creation	Market orientation, performance, policy, investment	Sustainable business models, impact investment funds
Cultural	Identity, meaning, and heritage as drivers of sustainability	Place-making, education, creative identity, heritage	Cultural tourism, creative-industry entrepreneurship

collaborative specialization: co-authorship networks reveal clusters of domain specialists working across thematic boundaries. These networks do more than signal productivity; they function as channels for epistemic integration, fostering the circulation and recombination of diverse theoretical and methodological perspectives (Micozzi et al. 2021).

We argue that this transdisciplinarity is not merely epistemological but also reflects the complex nature of real-world sustainability challenges, which demand integrated approaches.

Textual analysis and unsupervised clustering provide additional evidence of convergence. The resulting strategic maps highlight thematic clusters and the most frequent words that frequently cut across pillar boundaries, blending vocabularies and concerns from domains such as environmental justice, sustainable innovation, and place-based entrepreneurship. These clusters illustrate how sustainability challenges are increasingly framed in holistic terms, demanding responses that transcend traditional academic disciplines and fields.

From an epistemological standpoint, the F-PIF is informed by the concept of Mode 2 knowledge production (Gibbons et al. 1994), which characterizes contemporary research as context-driven, problem-focused, and transdisciplinary. In this view, knowledge is not generated solely within the boundaries of discrete disciplines but emerges from iterative engagement with complex, real-world challenges. The field of sustainable entrepreneurship, with its emphasis on innovation, agency, and systems transformation, offers a particularly fertile ground where different sustainability logics can be joined, reinterpreted, and mobilized toward actionable outcomes.

6 | Theoretical and Practical Implications

This study offers a considerable theoretical advancement in the field of sustainable entrepreneurship by proposing the F-PIF. The F-PIF is a conceptual model grounding the model in large-scale bibliometric and text-mining evidence that reconceptualizes sustainability not as a static, three-dimensional construct, but as an evolving and interdependent system comprising environmental, social, economic, and cultural dimensions. We show that sustainability logics are not discrete or hierarchical but transdisciplinary, and that this transdisciplinarity is integrated in contemporary entrepreneurship research. The F-PIF thus challenges the assumptions of linear, single-pillar models and provides a theoretical bridge between disparate strands of the literature, illustrating how these pillars intersect in the production of entrepreneurial knowledge and strategic practice. This study contributes to the broader conversation on sustainability integration, institutional complexity, and transdisciplinarity in business strategy.

Theoretically, the F-PIF contributes to sustainability and entrepreneurship studies by addressing a critical conceptual gap: the underexplored role of culture as an autonomous pillar in sustainability frameworks. Traditional models privilege economic viability and environmental responsibility, only sometimes extending to social equity. By introducing cultural sustainability within sustainable entrepreneurship, the framework adds a fourth, essential dimension that encompasses identity, sense of place, meaning-making, and local knowledge systems (Esteves et al. 2021). Our analysis highlights how cultural sustainability significantly influences entrepreneurial behavior, legitimizes practices, and fosters long-term commitment to sustainability objectives. The F-PIF positions culture not as a background variable or communicative layer but as one of the four constructive elements of sustainability, especially in place-based or community-driven entrepreneurial ecosystems.

Our framework builds on and extends prior debates in sustainability theory. Duxbury et al. (2016) propose four strategic paths for integrating culture into sustainable development, showing that culture is not only instrumental to other pillars but also a transformative force in its own right. Hahn et al. (2018) highlight that sustainability embodies paradoxes—descriptive, instrumental, and normative—that must be embraced rather than resolved, suggesting that multiple logics inevitably coexist and interact. Busch et al. (2023) likewise critique the search for a singular "business case" for sustainability and argue instead for plural, context-specific cases that combine economic, social, and normative rationales. These insights converge with our F-PIF model, which emphasizes intersectionality: sustainability pillars do not function as isolated categories but as co-constitutive logics that blend, overlap, and generate new entrepreneurial practices and knowledge. By visualizing this intersectionality, the F-PIF invites scholars to adopt more dynamic epistemological frameworks, moving toward a relational understanding of how business practices, institutional environments, and local cultures co-evolve. The implications are significant for the design of future research agendas: Scholars are encouraged to investigate hybrid entrepreneurial models, assess cross-pillar tensions and synergies, and develop methodologies that capture the complex structure of sustainability logics in different geographies and sectors.

Beyond its conceptual contribution, the bibliometric evidence presented in Section 3 also offers meaningful insights for business strategy and governance. The observed convergence among sustainability pillars mirrors an emerging strategic orientation in which firms integrate environmental, social, economic, and cultural goals within their core decision-making processes. Recent studies (Velte 2024; Kaur et al. 2025) similarly highlight how sustainability has evolved from a compliance-driven concern to a source of strategic differentiation and value creation. Our findings thus suggest that sustainable entrepreneurship increasingly operates as a governance logic, that is, linking board-level accountability, innovation capability, and community embeddedness within a single, transdisciplinary framework.

On the practical side, the insights provided by this study are highly relevant to entrepreneurs, business strategists, policymakers, and educators. For entrepreneurs and managers, the F-PIF offers a strategic orientation for navigating complex sustainability challenges by encouraging the design of ventures that operate at the confluence of multiple value dimensions. Rather than pursuing sustainability as a compliance or risk-mitigation exercise, entrepreneurs can use the framework to proactively integrate ecological, social, economic, and cultural objectives into their core business models (Saari et al. 2025). This integration can support innovation in areas such as circular economy practices, social enterprise models, sustainable tourism,

and culturally grounded business ecosystems (Sica et al. 2024). Firms that recognize the interdependence of these pillars are more likely to develop context-sensitive solutions, build trust with diverse stakeholders, and enhance their adaptive capacity in volatile environments (Palazzo et al. 2021).

Practically, the F-PIF can serve as a diagnostic and design tool for managers seeking to develop integrative business models. By mapping organizational initiatives or product strategies against the four sustainability dimensions, managers can identify synergies and gaps, aligning cultural legitimacy with social inclusion or ecological innovation with economic performance. The framework also provides a lens for managing stakeholder complexity: it encourages firms to recognize that investors, communities, customers, and regulators often operate according to different sustainability logics. Using the F-PIF as a guide, leaders can build governance and innovation strategies that balance these value dimensions rather than optimizing a single one.

For policymakers and funding agencies, the findings underscore the importance of supporting entrepreneurship policies that reflect the transdisciplinary nature of sustainable entrepreneurship (Kanda et al. 2021). This includes creating funding schemes, regulatory frameworks, and evaluation criteria that reward initiatives engaging with multiple sustainability logics simultaneously. Moreover, the F-PIF can inform the design of public policies, funding schemes, and evaluation metrics that reward projects addressing multiple sustainability dimensions simultaneously. Policymakers could, for instance, prioritize grant programs or innovation vouchers that integrate environmental, social, economic, and cultural objectives within the same initiative. Regulatory frameworks might also encourage reporting standards that measure cross-pillar performance, fostering accountability for multidimensional impact. In this way, the F-PIF provides not only an analytical framework but also a policy instrument for guiding more holistic sustainability transitions.

Finally, for educators and academic institutions, the F-PIF has clear pedagogical implications. Business and management curricula should be restructured to incorporate intersectional perspectives on sustainability, training students to understand how entrepreneurial action can simultaneously address ecological degradation, social inequality, economic viability, and cultural resilience. Case studies, project-based learning, and interdisciplinary collaboration can all be structured to reflect the F-PIF logic, ensuring that students are equipped not only with technical skills but also with the critical and systemic thinking needed to operate in an increasingly interconnected and sustainability-conscious global economy.

While the F-PIF highlights opportunities for integration, it also brings attention to the challenges and trade-offs organizations face when pursuing multidimensional sustainability. Tensions may arise between short-term financial viability and long-term environmental or cultural investments, or between global scalability and local embeddedness. Recognizing these trade-offs does not weaken the framework's value; rather, it underscores the need for adaptive strategies, transparent stakeholder dialogue, and iterative learning processes that allow organizations to balance competing goals while maintaining coherence with their sustainability vision.

Taken together, these theoretical and practical implications suggest that the future of sustainable entrepreneurship lies not in further specialization, but in deeper integration across disciplines, across sectors, and across value dimensions. The F-PIF offers a starting point for this evolution, providing both an analytical tool and a strategic compass for navigating the complexity of sustainability in entrepreneurship research and practice.

7 | Limitations of This Study

While this study offers a comprehensive and empirically grounded mapping of sustainability-oriented entrepreneurship, several limitations must be acknowledged. The exclusive reliance on the Web of Science Core Collection, while ensuring methodological consistency and data quality, inevitably narrows the scope of coverage. This database predominantly indexes English-language and high-impact journals, which may reinforce disciplinary and geographical biases and underrepresent practice-based, regional, and non-English scholarship. As a result, research and perspectives originating from the Global South or Indigenous contexts may be systematically underrepresented.

Furthermore, although the keyword-based classification framework was carefully constructed and iteratively refined through multiple enrichment cycles, the approach necessarily entails a degree of subjectivity. Decisions about keyword inclusion and pillar assignment depend partly on interpretive judgment, and thus some degree of misclassification or semantic ambiguity cannot be entirely excluded. Similarly, while the unsupervised clustering results demonstrated robust statistical performance (e.g., Silhouette Scores above 0.6) and thematic coherence, they were not qualitatively validated through expert coding or manual interpretation. Future research should therefore combine quantitative and qualitative approaches, such as, for instance, inter-coder agreement testing, focus groups, or targeted content analysis, to verify and deepen the interpretive robustness of computational findings.

Finally, although our analyses reveal strong co-occurrence and thematic convergence among sustainability pillars, the notion of their "co-constitution" should be interpreted as a theoretically informed extrapolation rather than a direct empirical observation. The F-PIF framework extends beyond statistical association to conceptualize how these dimensions may interact in shaping sustainable entrepreneurship. Subsequent research integrating longitudinal or qualitative data could help test and refine this interpretive claim.

8 | Conclusions and Future Research Agenda

This research explored the thematic structure, disciplinary evolution, and integrative dynamics of sustainable entrepreneurship research over the past two decades, with a focus on how the four different sustainability dimensions (environmental, social, economic, and cultural) intersect within the academic discourse.

The analysis demonstrates that the field has developed into a multidimensional and transdisciplinary domain where

sustainability issues increasingly intersect. To fully engage with this complexity, we have designed the F-PIF as a critical and integrative tool that captures the interplay among the four sustainability pillars.

In response to **RQ1**, which asked how the volume and thematic distribution of sustainability-oriented entrepreneurship research has evolved, our findings show a continuous growth in scholarly production, especially from 2013 onward. While the economic pillar remains the most frequently addressed, contributions relating to the environmental, social, and cultural dimensions have also grown significantly, pointing to a broader conceptualization of sustainability in entrepreneurship research.

Regarding **RQ2**, which explored the extent to which contributions reflect single-pillar, multipillar, or fully integrated approaches, our analysis reveals that multidimensional engagement has become the norm rather than the exception. Over 77% of the articles in the sample can be attributed to at least three sustainability pillars simultaneously, and more than one-third engaged with all four. This confirms a field-wide shift from fragmented, pillar-specific studies to more integrated and systemic understandings of sustainability challenges in entrepreneurship.

In answering **RQ3**, concerning the key journals, influential authors, thematic clusters, and collaboration patterns, we identified a diverse yet interconnected landscape. Journals such as *Business Strategy and the Environment, Sustainability*, and *Journal of Cleaner Production*, have been central both in terms of the number of papers published per year and in fostering cross-pillar contributions. Citation and co-authorship analyses further reveal the presence of influential research communities, with particularly strong contributions from scholars based in China, the UK, and parts of Europe. Thematic cluster analysis highlights the presence of well-developed core themes (e.g., green innovation, social enterprise, sustainable performance) and emerging areas (e.g., cultural identity, place-making, education).

Lastly, in relation to **RQ4**, which examined what conceptual patterns emerge from the interaction among sustainability pillars, the results illustrate the increasing centrality of intersectional themes. For instance, cultural heritage intersects with circular economy strategies or social equity goals inform environmental innovation. These overlapping zones have become fertile ground for theoretical innovation. The field is no longer primarily defined by economic opportunity embedded in environmental constraints, but increasingly by complex, context-sensitive processes involving social justice, cultural identity, and systemic transformation. The F-PIF model, introduced as a response to this complexity, enables a more nuanced understanding of how sustainability logics interact within entrepreneurial contexts. It offers a way to theorize not only the presence of multiple dimensions in entrepreneurial initiatives, but also their co-constitutive nature. It allows investigating how values, strategies, and narratives emerge through the intersections of pillars rather than within isolated domains. This perspective invites a reconsideration of conventional assumptions in both sustainability and entrepreneurship literature. Rather than seeking equilibrium between competing goals, the F-PIF model supports a dynamic, relational view of sustainability as a process of co-evolution, in which entrepreneurial action is shaped by and contributes to multifaceted systems of meaning, value, and practice.

The F-PIF model, offers a valuable lens for researchers, educators, and practitioners seeking to understand and shape entrepreneurial responses to sustainability challenges. Empirically, this research demonstrates that sustainable entrepreneurship has evolved into a multidimensional and cross- sectoral field. Theoretically, it introduces a unified framework that explains sustainability as an interrelated system of dynamics. From a managerial point of view, it provides a diagnostic and design tool for developing integrative business models and managing stakeholder complexity. From a policy perspective, the framework highlights the importance of financing and regulatory mechanisms that incentivize multiple-stakeholder initiatives and cross-sector collaboration.

Another promising avenue lies in empirically applying the F-PIF model across diverse industrial sectors and geographies. Future studies could compare how pillar integration varies across domains such as agri-food, energy, urban regeneration, or tech-enabled circular models, and examine how institutional contexts influence these dynamics.

A comparative study of this kind would help explain how sustainability approaches interact in practice, linking theoretical propositions to real-world business ecosystems.

Our findings highlight clear geographic asymmetries in knowledge production, with China and the UK dominating the field. Future research should critically examine how this imbalance might bias conceptual development or underrepresent region-specific concerns, particularly in under-studied regions such as Sub-Saharan Africa, Southeast Asia, and Latin America. Exploring how the F-PIF operates across these diverse contexts and how pillar interactions differ between the Global South and Global North would enhance the inclusivity and global relevance of sustainable entrepreneurship theory.

At a methodological level, future studies should build on the computational approach adopted in this paper by integrating in-depth qualitative and longitudinal research. While machine learning and bibliometric mapping provide large-scale, replicable insights, qualitative case studies, ethnographies, and participatory methods are essential to capture the lived experience of sustainability entrepreneurs and the embeddedness of their actions in specific cultural, institutional, and ecological contexts.

Moreover, the F-PIF model can be used not only as an analytical lens but as a generative tool for research design. Scholars might use the model to formulate hypotheses about how pillar intersections influence firm performance, stakeholder engagement, or legitimacy in contested environments. By operationalizing these intersections empirically, for instance through surveys, interviews, or comparative datasets, future studies could assess not just whether but how and why particular combinations of sustainability logics succeed or fail across contexts.

Looking forward, scholars should pay closer attention to global asymmetries in knowledge production and to how the F-PIF may operate differently in Global South versus Global North

contexts, and complement computational mapping with qualitative and longitudinal studies that capture the lived experiences of sustainability entrepreneurs. Ultimately, the F-PIF model provides a guide for orienting research and practice towards a form of sustainability that is fully integrated and culturally anchored.

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Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

[1] Note: Multidimensionality describes the empirical overlap between the pillars of sustainability, while transdisciplinarity refers to epistemological integration that goes beyond disciplinary boundaries.

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