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Entrepreneurial Ecosystems in the Post-Pandemic Era: A Bibliometric Mapping of Innovation, Start-ups and Policy Research

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ABSTRACT

This study performs a thorough bibliometric analysis to investigate the progression of entrepreneurial ecosystem research in the post-pandemic period. The study use the Scopus database alongside visualization tools like VOSviewer and Bibliometrix to delineate publishing trends, keyword co-occurrence, author networks, institutional collaborations, and international links. The results indicate that entrepreneurship, start-ups, innovation ecosystems, and technology transfer are major subject areas, but rising themes encompass digital entrepreneurship, sustainability, artificial intelligence, and the circular economy. Overlay and density visualizations demonstrate a temporal transition from crisis-driven research in 2020 to innovation-oriented and sustainability-focused subjects in 2021–2022. Networks of authors and affiliations underscore significant contributions from Audretsch, Stam, Mason, and prominent institutions in the United Kingdom, Germany, India, and Italy. The research advances the theoretical framework of entrepreneurial ecosystems and provides practical guidance for policymakers and practitioners. Constraints encompass dependence on a singular database and the progression of post-pandemic literature.

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1. INTRODUCTION

The COVID-19 pandemic transformed worldwide business landscapes and expedited fundamental modifications inside economic systems, impacting the operation and development of entrepreneurial ecosystems. Entrepreneurial e cosystems, comprising interconnected entities such as entrepreneurs, governmental bodies, financial institutions, academic institutions, and support groups, are acknowledged as vital catalysts for recovery and innovation during crises [1], [2]. In the post-pandemic period, these ecosystems encounter novel constraints and opportunities, as the pandemic revealed weaknesses in supply chains, expedited digital adoption, and underscored the significance of innovation-driven resilience [3]. As nations and regions strive to restore economic capability, comprehending the dynamics of entrepreneu rial ecosystems is essential for informing adaptive policy responses.

A salient feature of the post-pa ndemic entrepreneurial environment is the swift digital revolution evident across several sectors. Lockdowns and mobility restrictions encouraged enterprises to digitalize operations, rearrange value chains, and rapidly adopt new technical tools [4]. Entrepreneurs encountered disturbances in

customer behavior, labor availability, and capital flows, compelling them to innovate and diversify their business models. Studies demonstrate that ecosystems that promote information sharing, digital infrastructure, and collaborative innovation navigated the crisis more effectively than those without coordinated institutional assistance [5]. Therefore, analyzing the interactions among t hese ecosystem components in the post-pa ndemic era is crucial for the advancement of theory and practice.

Simultaneously, governmental measures were essential in influencing entrepreneurial endeavors during the pandemic. Numerous nations implemented focused stimulus initiatives, legislative mod ifications, and innovative incentives to assist start-ups and small enterprises [6]. Policy actions targeting liquidity restrictions, digital uptake, and technological innovation substantially impacted ecosystem stability and recovery [7]. Nonetheless, policy effects differed owing to variations in institutional maturity, entrepreneurial culture, and regional innovation capabilities [8]. Comprehending these discrepancies necessitates the mapping of policy-related re search trends and the identification of how scholars understand the government's role within entrepreneurial ecosystems during and post-pandemic.

Moreover, the surge of academic research concerning innovation, start-ups, and entrepreneurial ecosystems underscores the interdisciplinary character of this field of study. Academics in management, economics, public policy, regional development, and technology studies have significantly contributed to a burgeoning corpus of literature [9]. Notwithstanding this expansion, there exists a paucity of synthesis regarding the alteration in scholastic focus in reaction to post-pandemic issues. A bibliometric technique enables researchers to systematically examine publishing trends, identify prominent authors and journals, illustrate intellectual frameworks, and uncover new themes that influence the subject [10]. This strategy is crucial for delineating conceptual boundaries and recognizing research gaps.

Bibliometric mapping is especially effective for delineating the progression of research trajectories and the interrelations of innovation, start-up formation, and policy structures within entrepreneurial ecosystems. Utilizing methodologies such as co-authorship analysis, co-citation mapping, and keyword co-occurrence visualization, researchers can reveal knowledge clusters that characterize the post-pandemic period [11]. Employing bibliometric tools like VOSviewer or Bibliometrix augments the ability to methodically delineate intellectual frameworks and furnish evidence-based insights into the evolution of study subjects throughout time. This methodological approach is well suited to analyzing the fragmented and rapidly growing body of literature on the post COVID-19 entrepreneurial ecosystem.

Despite the increasing academic focus on entrepreneurial ecosystems, innovation d ynamics, and post-pandemic recovery, current research is disjointed and lacks a thorough, evidence-based synthesis of the evolution of intellectual frameworks, thematic clusters, and collaboration networks since COVID-19. Previous research typically invest igates certain elements of ecosystems—such as digital transformation, start-up resilience, or governmental interventions—without in corporating them into a comprehensive framework. Furthermore, limited research e xamines the post-pandemic era as a unique t ransformative phase utilizing rigorous bibliometric methods. This gap constrains po licymakers' and scholars' capacity to comprehensively comprehend the interplay between innovation, entrepreneurial activity, and government policies within entrepreneurial ecosystems during the recovery phase.

This study intends to provide an extensive bibliometric analysis of entrepreneu rial ecosystem research in the post-pandemic period, concentrating on innovation, start-ups, and policy-related scholarship. The expl icit objectives are to: (1) examine publication t rends, citation frameworks, and intellectual

connections within the domain; (2) identify prominent authors, nations, institutions, and journals that contribute to post-pandemic entrepreneurial ecosystem research; (3) delineate keyword co-occurrence to reveal emerging themes and conceptual clusters pertaining to innovation, start-up development, and policy interventions; and (4) recommend future research trajectories b ased on conceptual deficiencies and bibliometric data to assist scholars, practitioners, and policymakers in comp rehending and enhancing entrepreneurial ecosystems post-COVID-19.

2. METHOD

This study utilizes bibliometric analysis to systematically delineate the intellectual framework, thematic progression, and research trends of entrepreneurial ecosystems in the post-pandemic period. Bibliometric analysis is extensively employed in management, innovation, and entrepreneurship research since it facilitates the quantitative and objective assessment of substantial quantities of scientific publications [10]. This study employs a mixed-method approach in accordance with established bibliometric protocols, incorporating performance analysis to assess publication productivity, citation trends, and prominent authors, alongside science mapping to illustrate the conceptual, intellectual, and social frameworks within the field. The bibliometric approach is suitable for integrating disparate research streams and identifying emergent themes in swiftly evolving domains such as start-up innovation, entrepreneurship policy, and post-pandemic ecosystem transition.

This study's dataset was sourced from the Scopus database, a prominent and esteemed repository of peer-reviewed scientific literature in the fields of entrepreneurship, innovation, and policy studies [12]. The inquiry utilized a combination of keywords including "entrepreneurial ecosystem," "start-up ecosystem," "innovation ecosystem," "COVID-19," "post-pandemic," "entrepreneurship policy," and associated terms. Boolean operators (AND/OR) and field filters (title, abstract, keywords) were utilized to guarantee the acquisition of high-quality and contextually pertinent articles. The search timeframe was established from 2020 to 2025 to encompass post-pandemic scientific advancements. During the data-cleaning phase, duplicate entries, conference reviews, editorials, and non-English texts were eliminated, yielding a final corpus appropriate for bibliometric assessment.

This work used VOSviewer (version 1.6.x) and Bibliometrix (R-package) to analyze and visualize the dataset, both of which are esteemed tools in bibliometric research [13], [14]. VOSviewer was employed to create and analyze co-authorship networks, co-citation maps, and keyword co-occurrence visualizations, facilitating the discovery of prominent scholars, structural linkages, and theme groupings. Bibliometrix facilitated sophisticated statistical analysis, conceptual structure mapping, and temporal evolution modeling. This integrated analytical approach provides a thorough review of the evolution of research on entrepreneurial ecosystems concerning innovation, start-up development, and policy in the post-pandemic era. The integration of Scopus data with sophisticated bibliometric methods offers methodological precision and guarantees dependable results for informing future research and decisions.

3. RESULT AND DISCUSSIONS

3.1 Network Visualization

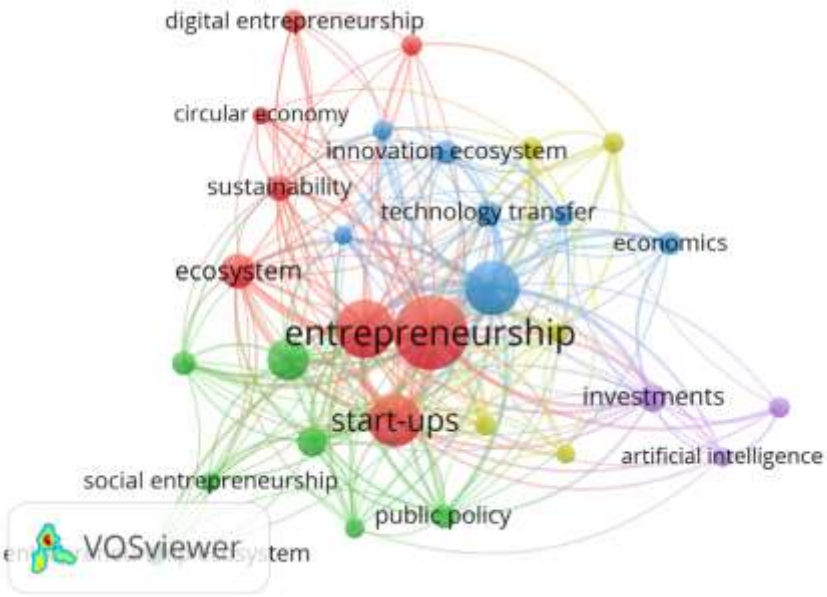

Figure 1. Network Visualization
Source: Data Analysis Result, 2025

The VOSviewer map illustrates that "entrepreneurship" constitutes the center and most prominent node in the network, signifying its fundamental p osition in the literature of post-pandemic entrepreneurial environments. The substa ntial scale and intricate connections indicate that entrepreneurship is concurrently associated with innovation, start-ups, public policy, and overarching economic issues. The convergence of ma ny clusters around this phrase indicates that academic discourse increasingly perceives entrepreneurship not as a solitary endeavor but as a systemic, multi-actor, and multi-dimensional phen omenon. This centrality illustrates how disruptions caused by the pandemic have positioned entrepreneurs as pivotal to economic resilience and transformation, leading scholars to investigate entrepreneurial activity across many social, technological, and regulatory frameworks.

The phrase "start-ups" is intricately linked to entrepreneurship, c onstituting a significant sub-cluster that highlights the increased study focus on early-stage enterprises and their adaptability. Throughout and subsequent to COVID-19, start-ups emerged as essential conduits for digital i nnovation, technical experimentation, and agile business models, hence estab lishing robust associations with terms such as “innovation ecosystem,” “technology transfer,” and “artificial intelligence.” The network suggests that academic discourse regards start-ups as both recipients and catalysts of ecosystem development. Their regular association with public policy indicates academic efforts to assess how governmental interventions—such as grants, accelerators, legislation, and d igitization support—have influenced start-up survival and growth during crises.

The map also emphasizes a strong innovation-driven cluster, compri sing elements such as innovation ecosystem, technology transfer, and artificial intelligence. This cluster indicates a post-pandemic focus on technical enhancement, digital entrepr eneurship, and collaboration between science and industry. The prominence of "technology transfer" as a key element

signifies a growing focus on how the movement of knowledge—from academic institutions to industry, or from laboratories to markets—enhances the resilience of entrepreneurial ecosystems. Furthermore, the connections to "artificial intelligence" indicate an emerging trend wherein AI-driven tools, data analytics, and automation are perceived as strategic facilitators for identifying entrepreneurial opportunities and gaining competitive advantage in the post-pandemic landscape.

A discernible cluster focuses on sustainability-related terms, such as "sustainability," "circular economy," "ecosystem," and "social entrepreneurship." These phrases constitute an integrated cluster that signifies the global transition towards ecologically and socially responsible entrepreneurship. The pandemic intensified the demand for sustainable and circular solutions, leading researchers to investigate how entrepreneurial ecosystems may facilitate transitions to greener, more egalitarian economic models. The robust connection between sustainability and entrepreneurship indicates that academics are progressively seeing ecological factors as essential to creative processes rather than marginal issues. The emergence of "social entrepreneurship" indicates a growing interest in community-oriented ventures that tackle systemic weaknesses exposed by the pandemic.

Finally, the cluster comprising "public policy," "economics," and "investments" exemplifies the persistent importance of institutional and financial elements within entrepreneurial ecosystems. Public policy serves as a nexus linking entrepreneurship, start-ups, sustainability, and technical innovation, underscoring the crucial function of governmental institutions in guiding ecosystem recovery and fostering long-term growth. The placement of "investments" and "economics" inside this framework indicates a sustained emphasis on venture capital, economic incentives, market dynamics, and fiscal policies. This cluster highlights the academic agreement that post-pandemic entrepreneurial ecosystems are influenced by the interaction of regulatory frameworks, financial accessibility, and overarching macroeconomic conditions. Collectively, these results elucidate a complex, multi-faceted framework wherein entrepreneurial resilience, digital transformation, sustainability, and policy assistance emerge as the predominant research themes in the post-pandemic context.

3.2 Overlay Visualization

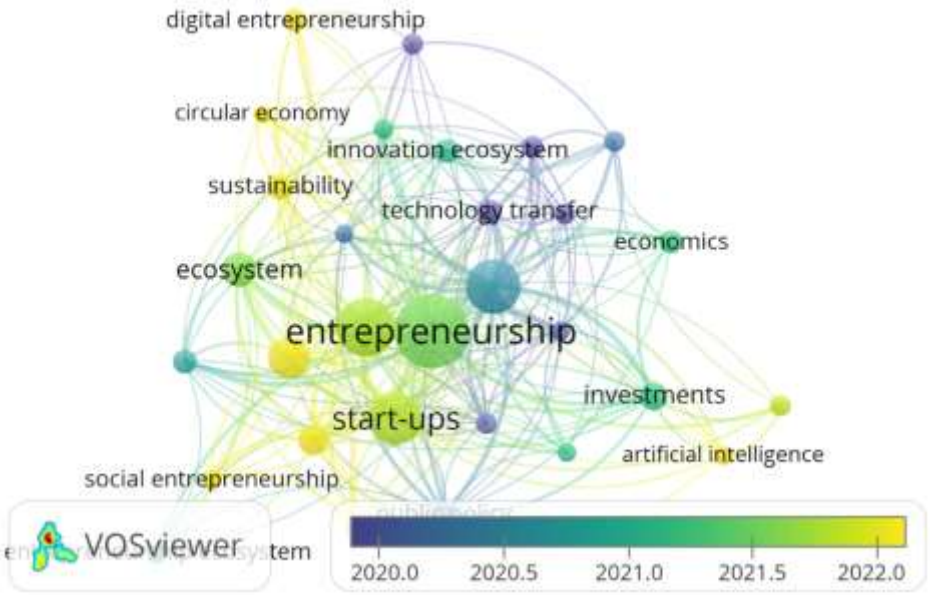

Figure 2. Overlay Visualization
Source: Data Analysis Result, 2025

The overlay graphic demonstrates a distinct temporal evolut ion in the emergence of research themes across entrepreneurial ecosystem studies following the epidemic. Keywords hig hlighted in dark blue to green (2020–2021), including technology transfer, innovation ecosystem, economics, and public policy, signify topics that prominently appeared at the onset of the pandemic. This pattern indicates that initial COVID-19 research focused on comprehending economic changes, analy zing policy responses, and evaluating how technology transfer and innovation infrastructure could facilitate swift adaptation. These fundamental subjects la id the theoretical foundation for analy zing entrepreneurial resilience and institutional reactions to crisis situations.

As the hue transitions from green to yellow (2021–2022), terms such as entr epreneurship, start-ups, and ecosystem gain significance, indicating the hei ghtened academic attention on recovery dynamics and ecosystem fortification. The prevalence of these phrases, along with their significant co-occurrence, suggests that research conducted after 20 21 focused on how entrepreneurs and start-ups adapted their business models, utilized ecosystem support, and facilitated post-pandemic recovery. The location and dimensions of these nodes indicate that entrepreneurship-related themes emerged as important hubs, amalgamating insights from technology, sustainability, and policy studies into a cohesive discourse on ecosystem regeneration.

The latest themes, indicated by the prominent yellow nodes, encompass digital entrepreneurship, circular economy, sustainability, social entrepre neurship, and artificial intelligence. These signify nascent research trajectories that acquired traction in 2022, indicating a transition towards enduring transform ation rather than ephemeral crisis management. The increasing prominence of sustainability and the circular economy signifies the convergence of entrepreneur ship literature with worldwide demands for environmentally friendly and inclusive recovery frameworks. The rise of digital entrepreneurship and AI signifies a growing interest in technological innovation as a strategic facilitator for future entrepreneurial ecosystems. The overlay map illustrates a

temporal shift from crisis-induced technology and policy issues in 2020 to in novation-centric, digital, and sustainability-focused research pathways by 2022.

3.3 Citation Analysis

An analysis of the most often referenced works in entrepreneurial eco systems uncovers the conceptual underpinnings that persistently influence modern research, especially in the post-pandemic context. These seminal works underscore the development of critical concepts such digital entrepreneurship, the functions of accelerators, frameworks for ecosystem measurement, and the interaction among spatial, institutional, and technological affordances. Analyzing the citation performance and theoretical contributions of foundational studies enables the identification of prevailing schools of thought, methodological trends, and conceptual shifts that support the burgeoning literature on innovation, start-ups, and ecosystem policy. The subsequent table displays a meticulously compiled list of the most-cited articles th at provide the foundation of entrepreneurial ecosystem study.

Table 1. Top Cited Research

Citations	Authors and year	Title
1174	[3]	Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems
840	[15]	Toward a process theory of entrepreneurial ecosystems
764	[16]	The lineages of the entrepreneurial ecosystem approach
690	[17]	Entrepreneurial ecosystems in cities: establishing the framework conditions
319	[18]	The age of digital entrepreneurship
255	[19]	Accelerator expertise: Understanding the intermediary role of accelerators in the development of the Bangalore entrepreneurial ecosystem
253	[20]	The causal relation between entrepreneurial ecosystem and productive entrepreneurship: a measurement framework
173	[21]	Accelerating entrepreneurs and ecosystems: The seed accelerator model
163	[22]	The effects of business accelerators on venture performance: Evidence from start-Up Chile
159	[23]	Digital entrepreneurship and its role in innovation systems: A systematic literature review as a basis for future research avenues for sustainable transitions

Source: Scopus, 2025

These extensively referenced publications illustrate the multifaceted development of entrepreneurial ecosystems research and its growing s ignificance in a digital and post-pandemic environment. Pioneering contributions, notably by [16], [17], provided the theo retical framework and institutional prerequisites essential for ecosystem growth, especially in urban environments. Process-oriented ideas pr esented by [15] broadened the subject by highlighting the dynamic, relational, and cultural elements of ecosystems. The swift emergence of digital entrepreneurship, as demonstrated by [18], [23], signifies a paradigm shift towards technology-driven entrepreneurship, propelled by global disruptions like COVID-19. R esearch on accelerators, including works by [19], [21], [22], underscores the increasing significance of intermediary organizations that influence founder competencies and venture results. The measuring frameworks put forth by [20] highlight the growing methodological sophistication within the area. Collective ly, these papers constitute a unified

repository of knowledge that persists in directing research on innovation, policy, and start-up ecosystems in the post-pandemic context.

3.4 Density Visualization

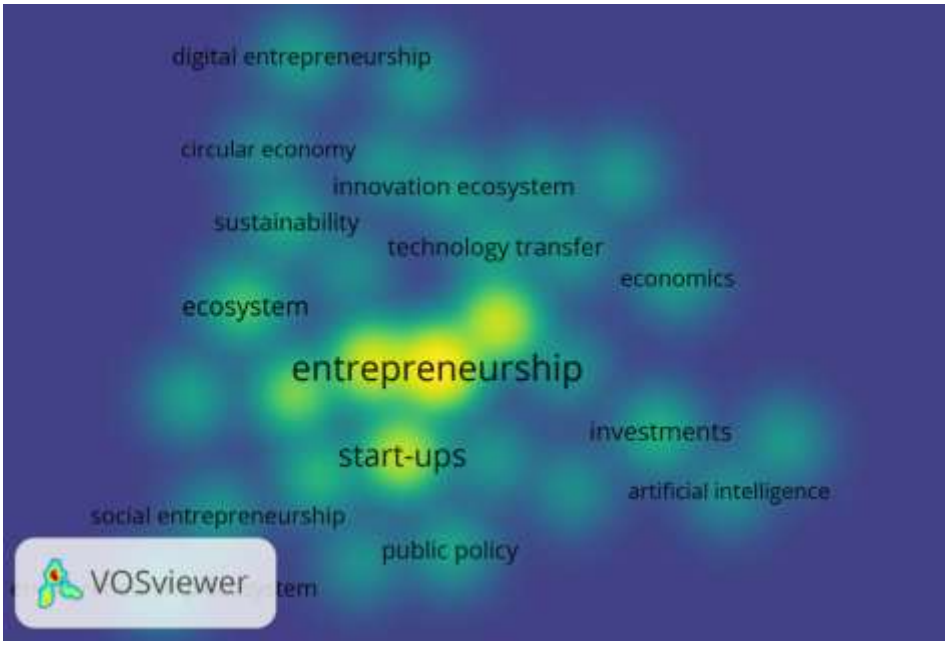

Figure 3. Density Visualization
Source: Data Analysis Result, 2025

The density visualization underscores entrepreneurship as the most extensively examined and interrelated issue in the academic domain. The bright yellow zone signifies an exceptionally high frequency of co-occurrence and centrality, validating its role as the conceptual nucleus of the post-pandemic entrepreneurial ecosystem literature. Encircling this center, the terms start-ups, ecosystem, technology transfer, and innovation ecosystem have significa nt density, indicated by lighter green clusters. This indicates that a significant portion of scholarly discourse centers on the interplay between entrepreneurial activity and innovation processes, knowledge transfer channels, and the overarching structural conditions that facilitate ecosystem functionality. The visual prominence of these clusters indica tes their significant importance in elucidating post-pandemic adaptation and the systemic function of entrepreneurship in facilitating economic recovery, innovation dissemination, and new venture establishment. The density map indicates the emergence of less prevalent study themes, including digital entrepreneurship, circular economy, sustainability, investments, and artificial intelligence, as one moves away from the central cluster. Their green-blue hues signify that they are significant yet still evolving domains within the literature. These subjects indicate a growing academic emphasis on tech nology-driven entrepreneurship, eco-fri endly innovation, and changes in funding and investment trends post-COVID-19. Concurrently, terms like public policy and social entrepreneurship emerge in areas of lower density, underscoring their function as ancillary yet less prominent subjects. The density visualization illustrates a study domain predominantly focused on entrepreneurship and start-up dynamics, but concurrently expanding into sustainability, digital transformation, and technological innovation—fields anticipated to gain prominence in future research.

3.5 Co-Authorship Network

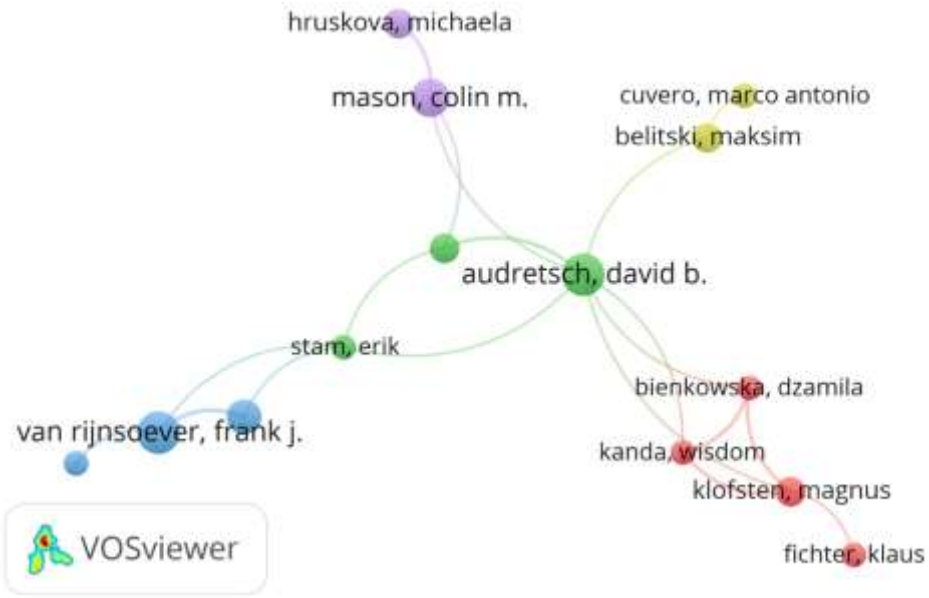

Figure 4. Author Visualization
Source: Data Analysis Result, 2025

The co-authorship map identifies David B. Audretsch as the pivotal and most significant individual within the entrepreneurial ecosystem research network. His node is the largest and most interconnected, signifying his vast connections and robust citation links across several scholarly groups. On the left, Erik Stam and Frank J. van Rijnsoever constitute a unique blue-green cluster, indicative of a research trajectory centered on entrepreneurial ecosystem frameworks, regional innovation, and ecosystem assessment. Colin M. Mason and Michaela Hruskova are represented as a purple cluster above Audretsch, linked to research on entrepreneurial finance, regional development, and ecosystem dynamics. Maksim Belitski and Marco Antonio Cuvero form a yellow cluster on the right side, representing research on urban ecosystems, policy frameworks, and digital transformation. The red cluster, consisting of Magnus Klofsten, Wisdom Kanda, Dzamila Bienkowska, and Klaus Fichter, embodies an academic focus on sustainable entrepreneurship, green innovation, and science-driven entrepreneurship. The arrangement indicates that while these clusters include distinct topic lines, they are interconnected by Audretsch, highlighting his importance in integrating several schools of thought within entrepreneurial ecosystem studies.

Figure 5. Affiliation Visualization
Source: Data Analysis Result, 2025

The depiction of the affiliation network demonstrates a highly interwove n and institutionally varied landscape within entrepreneurial ecosystem r esearch. The Department of Management Studies serves as a central hub, linking several universities and research i nstitutions across multiple countries. The enormous node size and dense connections suggest a significant contribution to joint research in entrepreneurship, innovation, and susta inability. Encircling this core, numerous esteemed institutions such as the Adam Smith Business School, Aalto University School of Business, and Handelshochschule Leipzig constitute closely integrated clusters that exhibit robust co-authorship trends and thematic congruence, especially in the domains of digital entrepreneurship, policy studies, and sustainability transitions. The apex of the network comprises the commercial Applications Department, which stands out as a significant cluster leader with several external affiliations to entities involved in applied research, technology transfer, and commercial innovation. This indicates that the domain is significantly influenced by entities conc entrating on the practical and technological aspects of e ntrepreneurship. Simultaneously, repre sentatives from institutions like Amity University (India) and Università degli Studi della Campania (Italy) de monstrate increasing involvement from developing academic regions, thereby enhancing the geographic diversity of the research environment. The vibrant clusters demonstrate both theme expertise and inter-institutional collaboration that surpasses regional limitations. The map illustrates that research on entrepreneurial ecosystems flourishes inside a robust, global network of academic connections, with prominent management schools and sustainability centers serving a pivotal role in producing significant scholarship.

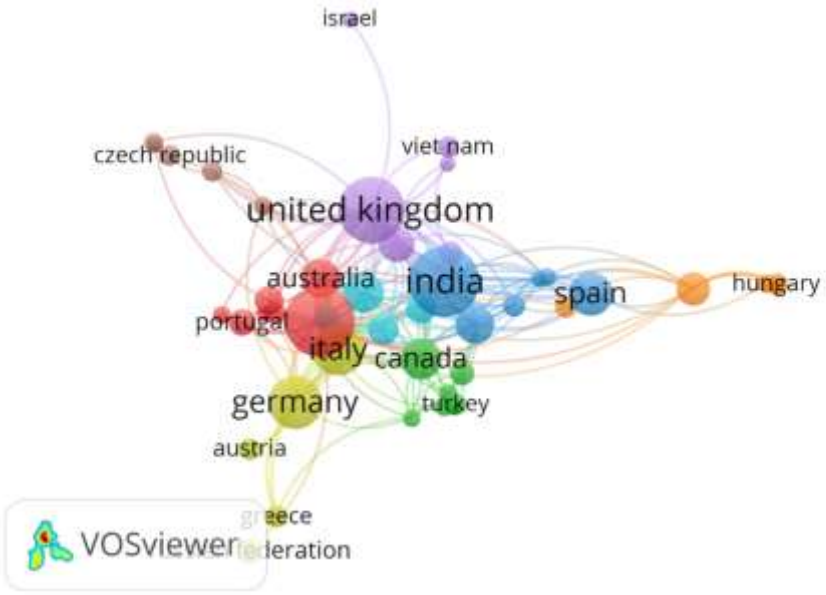

Figure 6. Country Visualization
Source: Data Analysis Result, 2025

The nation collaboration map illustrates a research landscape in ent repreneurial ecosystem studies that is globally diffused yet centrally grouped. The graphic prominently displays the United Kingdom, India, Germany, Italy, Spain, and Australia as significant hubs, denoted by their greater node sizes and numerous linkages. This indicates that these nations are the principal contributors to the domain and often cooperate in generating significant rese arch on entrepreneurship, innovation ecosystems, and post-pandemic digital t ransformation. The robust connections among the United Kingdom, India, and Australia indicate a transnational research network propelled by common academic interests, institutional collaborations, and the preeminence of English-language publications. Countries like Germany and Italy constitute strong European partnership clusters, demonstrating their significant involvement in sustainability-focused and policy-driven entrepreneurial research. Countries like as Hungary, T urkey, Canada, Portugal, the Czech Republic, Israel, and Vietnam emerge as minor although expanding providers on the network's periphery. Their moderate connections to central hubs signify increasing involvement in the global discourse, frequently via collaborations with more established research countries. The placement of Hungary and Spain on the right exemplifies regional collabora tion dynamics in Southern and Eastern Europe, whereas nations such as Israel and Vietnam demonstrate selective yet significant partnerships, presumably linked to specific themes like technological entrepreneurship or i nnovation policy. The map illustrates a highly integrated global research eco system, characterized by concentrated knowledge production in principal a cademic centers, while also benefiting from emerging contributions from a variety of nations.

3.6 Discussions

a. Practical Implications

This bibliometric study's findings provide significant practical implications for policymakers, ecosy stem developers, incubators, accelerators, and organizations sup porting entrepreneurship. The prominence of themes like ent repreneurship, start-ups, innovation ecosystems, and technology transfer s uggests that post-pandemic recovery

strategies must focus on enhancing innovation infrastructures, facilitating knowledge transfer bet ween academia and industry, and bolstering digital transformation assistance for start-ups. Policymaker s can leverage these insights to develop targeted initiatives that cultivate digital entrepreneurship, advance sustainable business models , and improve regional ecosystem connectedness. The prominent occurrence of sustainability-related terms like circular economy and social entrepreneurship underscores the increasing demand for support systems that promote environme ntally responsible and socially oriented innovation. For practi tioners, comprehending the prevail ing research clusters and collaboration patterns enables eco system participants to identify strategic partners, benchmark exemplary practices, and allocate r esources to regions with the greatest potential for ecosystem expansion and resilience.

b. Theoretical Contributions

This study offers significant theoretical advances by integrating the disparate literature on entrepreneurial ecosystems and elucidating its development over the post-pandemic era. The co-occurren ce and overlay visualizations elucidate the conceptual boundaries o f the area, illustrating the intricate interconnection between entrepreneurship, digitalization, su stainability, and policy interventions as foundational theoretical pillars. Secondly, by delineating networks of authors, affiliations, and international collaborations, the study enhances the theoretical comprehension of the global structure of knowledge production—illuminating the influence of prominent scholars (e.g., Audretsch, Stam), significant research centers (e.g., UK, Germany, India), a nd interdisciplinary institutional clusters in shaping the discourse of the ecosystem. The study enhances ecosystem theory by illustrating a temporal transition from crisis oriented research in 2020 to innovation-driven, digital entrepreneurship and sustainability-focused models in 2022, thereby augmenting existing frameworks with a post-pandemic perspective. This bibliometric mapping enhances the theoretical foundation of entrepre neurial ecosystems by providing a cohesive, data-driven comprehension of their intellectual structure and prospective research directions.

c. Limitations

This work, despite its co ntributions, has numerous s hortcomings that require acknowledgment. The analysis is only based on the Scopus database, which, while extensive, may omit pertinent publications indexed in Web of Science, Google Scholar, or regional databases. This may lead to an incomplete depiction of worldw ide research output, especially from emerging nations whose journals are less frequently indexed by Scopus. Moreover, bibliometric techniques emphasize quantitative publication trends and co-occurrence frequencies, so failing to encapsulate the intricate qualitative insights, contextual profundity, or causal mechanisms inherent in entrepreneurial ecosystem dynamics. The analysis of clusters an d theme developments is constrained by keyword uniformity, variances in author naming conventions, and terminological discrepancies among disciplines. As the post-pandemic era continues to develop, the dataset reflects a dynamic domain; further research must revise the analysis as new publications arise. These constraints underscore the necessity of augmenting bibliometric data with qualitative, longitudinal, or mixed-

methods strategies to attain a more comprehensive knowledge of entrepreneurial ecosystem evolution.

4. CONCLUSIONS

This bibliometric analysis offers a thorough and systematic insight into the evolution of research on entrepreneurial ecosystems in the post-pandemic period, emphasizing the principal themes, conceptual frameworks, and collaborative networks that characterize the discipline. The mapping results indicate that entrepreneurship, start-ups, and innovation ecosystems are pivotal in the literature, underscoring their essential role in fostering economic resilience and facilitating company change in reaction to global upheavals like COVID-19. The analysis reveals a distinct temporal evolution from cr isis-focused research in 2020—focusing on public policy, technology transfer, and econo mic stability—toward sustainability-oriented and technology-driven themes such as digital entrepreneurship, artificial intelligence, and t he circular economy that emerged in 2021 and 2022. This transformation indicates a broader movement from short-term crisis manag ement tactics to long-term ecosystem enhancement and digital advancement. More over, the networks of authors, affiliations, an d international collaborations demonstrate that research on entrepreneurial ecosystems is profoundly global and interdisciplinary, feat uring significant contributions from scholars like Audretsch, Stam, and Mason, alongside prominent institutions in the United King dom, Germany, India, Australia, and Italy. These cooperation have enhanced the diversit y of viewpoints and promoted cross-regional knowledge exchange in ecosystem development initiatives. Notwithstanding these positives, the study recognizes shortc omings pertaining to database coverage, inconsistencies in keywords, and the dynamic character of post-pandemic literature. Nevertheless, the results provide significant insights for policymakers, scholars, and practitioners aiming to comprehend how entrepreneurship and innovation ecosystems might be utilized to facilitate sustainable recovery, digital transformation, and inclusive economic progress. Future study ought to use qualitative or mixed-method approaches to enhance contextual comprehe nsion and investigate emergent themes that transcend the initial post-pandemic phase.

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