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Original scientific paper

Exploring the Landscape of Research on Enterprise Green Environments Through Science Mapping Analysis

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Abstract: This study employs science mapping and bibliometric analysis to chart the knowledge structure and research trajectory of enterprise green environment literature from 2002 to 2022. Despite rising interest, comprehensive analyses of this field's research landscapes and dynamics remain scarce. Through advanced techniques including discipline mapping, journal co-citation analysis, author co-citation analysis, and keyword co-occurrence analysis, this work elucidates the prominent disciplines, publications, authors, and research foci in enterprise of green environment scholarship over the past two decades. The results provide vital insights into the current status, influential leaders, core journals, knowledge gaps, and future directions of this rapidly evolving field. This science mapping analysis offers a valuable quantitative overview of green environment research enterprise that can inform scholars worldwide in producing impactful work on this critical area. The findings reveal profound implications for the developing structure and frontiers of sustainability-focused business and management research.

Keywords: bibliometric analysis; green environment enterprise; science mapping analysis; sustainability

1 INTRODUCTION

In the 21st century, the imperative of environmental consciousness has ushered in an era where the coexistence of humanity and nature holds paramount importance. The notion of cultivating green environments has transcended a mere trend, emerging as a pivotal consideration within economic undertakings. Nevertheless, a stark societal reality persists: the environment frequently finds itself relegated in favor of ostensibly more tangible gains [1]. This concession to the march of societal and economic progress underscores a prevalent perspective that deems the green environment a superfluous embellishment, an aesthetic facet of both enterprises and societies, rather than an essential prerequisite [2]. For an extended duration, the objectives of commerce and environmental preservation appeared irreconcilable [2]. However, as the deleterious effects of escalating environmental pollution and depleting resources have become increasingly manifest, enterprises confront an inescapable quandary at the intersection of development and environment. Globally, governmental bodies, industries, and scholars alike have embarked on an exploratory quest for diverse green technologies and methodologies [3-4]. These encompass a spectrum of approaches, from harnessing renewable resources [5], embracing green design principles [6], formulating sustainable urban plans [7], cultivating eco-conscious supply chains [8], to leveraging the potential of the green Internet of Things [9]. These efforts collectively aim not only to foster consumer well-being and public health but also to realize a harmonious triad of economic, social, and environmental benefits. To fulfill the requisites of environmentally sustainable practices, enterprises find themselves compelled to recalibrate their fundamental production paradigms and operational tenets [10-13]. Recent years have witnessed a surge in research vigor devoted to the realms of enterprise green environments and sustainability. This burgeoning scholarly exploration has yielded a proliferating corpus of insights. Yet, it remains critical to acknowledge that the domain of enterprise green environment embodies a multifaceted fusion of natural and synthetic elements, each integral to its composition. This intricate blend demands a multidisciplinary comprehension and expertise, posing a challenge for researchers to efficiently traverse the intricate tapestry of existing research, identify latent gaps, and chart prospective directions [14]. In the contemporary landscape of the digital economy and expansive datasets, the pertinence of literary resources has never been as pronounced as it stands today, hinting at its burgeoning importance as an indispensable research asset in the foreseeable future. Within this voluminous repository of literary works, science mapping, or bibliometric mapping, emerges as a compelling tool to aid researchers in navigating this vast sea of knowledge. Commonly referred to as knowledge domain visualization or knowledge domain mapping in the realm of library and information science, science mapping assumes the form of an assemblage of spatial graphs that unfurl the intricate tapestry of knowledge development and its structural underpinnings. It functions as a conduit for delineating the origins of knowledge, the agents that bear this knowledge, and further endeavors to excavate, scrutinize, construct, and visually represent the interwoven fabric of knowledge and its intricate interlinkages. A product of the harmonious amalgamation of multidisciplinary theories and methodologies drawn from applied mathematics, graphics, and information science, science mapping is instrumentalized through the prism of citation analysis, co-occurrence patterns, and visualization techniques. This mosaic of methodologies culminates in the illumination of the core fabric of disciplines, their historical evolutionary trajectories, their nascent frontiers, and the overarching architecture of knowledge itself [14]. By virtue of its design, science mapping functions as an illuminating conduit for researchers, facilitating an understanding of the dispersion of disciplines, the focal bastions of influence within institutions and the scientific community, the prominent scholarly conduits of dissemination, and the presently fervent loci of research exploration. Against this backdrop, the imperative to visually chart the prevailing patterns, distinguishing attributes, and burgeoning focal points of enterprise green environment research assumes a profound significance from the vantage point of bibliometrics. This study undertakes the mantle of a science mapping analysis of the domain of enterprise green environment, unraveling its

present-day crucibles of exploration and the distinctive hallmarks that characterize its trajectory. By doing so, this research endeavor aspires to furnish a compass for future investigations, furnishing scholars within this domain with both a guiding light and a wellspring of reference.

2 LITERATURE REVIEW

Compared to the increasing publications of enterprise green environment research, few scholars use bibliometrics to analyse existing literatures to provide knowledge support for other researchers in different domains. Existing research mainly focuses on the following topics or specific subfields of green environment and sustainability, such as green supply chain [15], environmental practices [16], corporate sustainability [17], environmental laws [18], sustainable new product development [19]. However, these surveys were absent in the vivid panorama of enterprise green environment literatures. It is still a hard work for related researchers to understand the knowledge structure, knowledge base and future research trends. Moreover, the dynamic nature of the research frontier forces scholars and policy researchers to keep up with the latest research [20]. It is increasingly essential to identify emerging trends, and sudden changes in a certain scientific knowledge domain. But these are no illustrations in the above articles. In the past two decades, with the rapid development of computer graphics and related sciences, scientific visualization has become a reality and made great progress. Science mapping based on bibliometrics, comprehensively integrates advanced technologies and methods of mathematics, statistics, information science and other disciplines to identify the knowledge structure, intellectual base, scientific change, research front [12]. Moreover, many representative software tools were exploited to facilitate the information visualization and science mapping of knowledge domains. For example, some specific science mapping software tools [20-30] are frequently used. The visualization analysis software tool used in this article is Citespace. It is developed by Team Chaomei Chen, and it is a Java-based information visualization and scientific mapping software package. Everyone can freely download it at http://cluster.cis.drexel.edu/~cchen/citespace/. Citespace can be used to co-word networks analysis and co-citation networks analysis of keywords, authors, institutions, journals and subject categories, etc. More importantly, Citespace can facilitate to identify the chronologic patterns of a specific knowledge domain, including research hotspots, intellectual turning points, and citation burst. These patterns are vital for researchers understanding a field of study. This article performed a science mapping analysis to distinguish the above existing surveys in several aspects. Firstly, this study involved all English journal publications related to green environment between 2002 and 2022 in the WOS. Secondly, this study does not simply describe the concentrated distributions, more important, it used science mapping to depict the knowledge structure of different networks, knowledge base and research fronts of enterprise green environment. This study makes it possible to identify systematically a more comprehensive picture of enterprise green environment research field. Therefore, it will help the would-be enterprise green environment researchers understand current research situation, research gaps, pioneer authors they should focus in enterprise green environment research activities. Moreover, this article will also supplement the developments and applications of enterprise green environment in the future. The article is organized as follows: section 3 describes research methodology, including data source and methodology. Section 4 demonstrates analysis results and discussion, including the knowledge structure, the intellectual turning points, citation bursts, knowledge base and research fronts. Section 5 presents conclusions.

3 RESEARCH METHODOLOGY

3.1 Data Source

Commonly used data sources of bibliometrics come from the Web of Science (WOS), Scopus, Google Scholar (GS), and PubMed [14]. Each database has its own advantages and drawbacks [31]. Compared to other databases, WOS practices more detailed citation data to meet our citation analysis demand. Furthermore, compared to the books and reports, core academic journals tend to be more direct, consistent and important channels for scientists to publish, spread, accumulate, comment on and assume the lead in a specific scientific research field. We therefore select the journal articles in the WOS as our target data sources [32-33]. The first step is to get research literature related to enterprise green environment. Hence, this article initially retrieved some research literature regarding only "enterprise green environment" as the baseline. The initial advanced search terms "TS = ((enterprise) AND green environment) " and publication date between 2002 and 2022 resulted in 1509 works of literature. Nevertheless, many research works of literature containing synonyms or a subset of enterprise green environment were not retrieved by this search, like "firm", "company", "corporation" or "corporate". Therefore, all of the words should be added to the search filters. For the convenience of research description, the search results were restricted by the language (English) and the database (the WOS Core Collection). Moreover, this article focused on the research literature in the WOS Core Collection during the past twenty years. Therefore, this article restricted the time span from 2002 to 2022. Eventually 7174 effective documents were obtained. The bibliographic records were downloaded, including titles, authors, institutions, keywords, references, etc.

3.2 Methodology

Fig. 1 shows our bibliometric analysis procedure. Detailed descriptions are provided in the following sections.

We downloaded the bibliographic records from the WOS including full record and cited references. The datasets from the WOS can be in XML format, CSV spreadsheet file, or other file formats. We use Citespace to extract bibliometric data fields, such as Category, Institution, Cited Author, Cited Journal, Cited Reference, and Keyword, create different items pairs, and build needed networks. In Citespace, the 21 year time interval between 2002 and 2022 was sliced into seven 3 year segments, which started from 2002 - 2004 and ended with

2020 - 2022. We select some most cited or occurred items from each slice to build special networks. Moreover, compared with Minimum Spanning Tree (MST) algorithm, Pathfinder algorithm is used to simplify the networks and highlight some important structure characters.

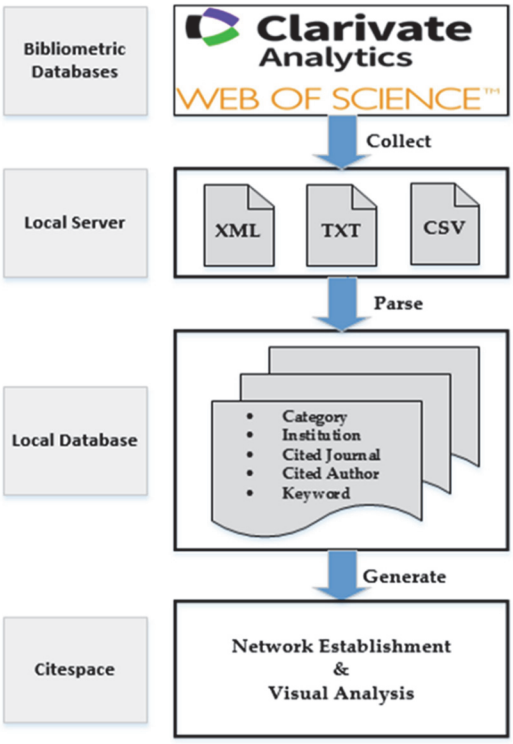

Figure 1 Bibliometric analysis procedure

For example, it commonly used to eliminate redundant or counter-intuitive connections and to retain the most salient ones [34]. Co-word analysis [35], document co-citation analysis (DCA) [36-37], author co-citation analysis (ACA) [38, 39] and information visualization techniques [40-42] are applied in Citespace. These distinctive bibliometric and visual techniques can provide interactive visual representations of abstract data to reinforce human cognition, reveal and visualize the knowledge structure, intellectual base, and research front of green environment research between 2002 and 2022. Particularly, high frequency items, intellectual turning points, burst points and emerging trends of green environment research are detected. These pieces of information have important reference value and significance for the new scholars in a certain green environment research field.

4 RESULTS AND DISCUSSION

4.1 Discipline Distribution

Discipline distribution can be used to reveal related disciplines, interdisciplinarity, and their respective roles. Tab. 1 lists top10 highest frequency categories of green environment research. According to WOS database, the most subject category is Business & Economics, followed by Environmental Sciences & Ecology, Management, Business, Engineering, Environmental Sciences, Environmental Studies, et al.

Table 1 Top 10 highest frequency categories

Frequency	Burst	Centrality	Category
2855		0.16	Business & Economics
2106		0.04	Environmental Sciences & Ecology
1837		0.23	Management
1568	4.41	0.18	Business
1484	17.61	0	Engineering
1278		0.18	Environmental Sciences
1269		0.23	Environmental Studies
1217	57.98	0.07	Science & Technology - Other Topics
1102	63.15	0.22	Green & Sustainable Science & Technology

Fig. 2 shows a merged co-occurrence network of subject categories between 2002 and 2022. This merged co-occurrence network is constructed by top 100 most occurrence subject categories from each slice after 263 iterations. Each node and the size represent each subject category and its importance, and the thickness of the lines between two nodes represents the link strength.

Figure 2 The merged co-occurrence network of subject categories

As shown in the above, the co-occurrence network reveals 176 disciplines related to enterprise green environment research between 2002 and 2022. The green environment research outcomes were published initially in Environmental Sciences, Management and related research field, then in Green & Sustainable Science & Technology and Business. All of these reveal the chronological sequences of interdisciplinarity in enterprise green environment research field. It is worth noting some categories with purple outer tree rings, such as Environmental Studies category and Management category. These categories not only are landmark nodes with most co-occurrence frequency, but also have highest betweenness centrality, which indicate that these categories are important to this network. For example, the Environmental Studies category interconnects with Environmental Science, Economics and Business. Management category interconnects with Business & Economics, Information Science & Library Science, Operations Research & Management Science, and so on.

These two categories are significant to enterprise green environment research.

4.2 Journal Co-citation Analysis

Journal co-citation analysis is a quantitative research method in bibliometrics and scientometrics, which has been widely used by domestic and foreign researchers in many disciplines. Through the analysis of journal co-citation, this article can locate and classify journals, determine the core or edge position of journals in the discipline, and then evaluate academic journals. According to the cited journal analysis, the above 7174 articles cited 140222 references in thousands of journals. The top 10 most co-citation journals are listed in Tab. 2. The most co-citation journal is Journal of Cleaner Production, followed by Journal of Business Ethics, Strategic Management Journal, Academy of Management Review, Business Strategy and the Environment, Academy of Management Journal, Corporate Social Responsibility and Environmental Management, International Journal of Production Economics, Harvard Business Review, and Sustainability. These top 10 most co-citation journals are the main publication channels of cited articles. Moreover, the most categories of top 10 co-citation journals are Business, Management, and Environmental Studies. This result coincides with the macro-level analysis of discipline categories (see section "Discipline Distribution").

Table 2 Top10 most co-citation journals

Journal	Freq.	IF	Category
Journal of Cleaner Production	10037	11.072	Green and Sustainable Science and Technology; Environmental Engineering; Environmental Sciences
Journal of Business Ethics	8145	6.331	Business; Ethics
Strategic Management Journal	4687	7.815	Business; Management
Academy of Management Review	4578	13.865	Business; Management
Business Strategy and the Environment	4200	10.801	Business; Environmental Studies; Management
Academy of Management Journal	3942	10.801	Business; Management
Corporate Social Responsibility and Environmental Management	2798	8.464	Business; Environmental Studies; Management
International Journal of Production Economics	2585	11.251	Engineering, Industrial; Manufacturing Engineering; Operations Research and Management Science
Harvard Business Review	2232	12.129	Business; Management

Source: Web of Science and Journal Citation Reports; IF impact factor in 2021.

Fig. 3 is a merged co-citation network of highly cited journals including the top 100 most cited references in each slice after 1291 iterations. The nodes with red inner tree rings indicate these co-cited journals have a strong citation burst in a certain period. Namely, the journals with red inner tree rings suggest that their citations have rapidly increased in a given period. According to the burst analysis, there are 115 cited journals with strongest citation bursts. Among them, Business strategy has the strongest citation burst 60.8769 between 2008 and 2014, followed by MIT Sloan Management Review (48.1463) between 2009 and 2014 and Strategic Management (45.9629) between 2007 and 2016.

Figure 3 The merged co-occurrence network of highly cited journals

4.3 Author Co-citation Analysis

The basic assumption of Author co-citation analysis (ACA) method is: when the literature of two authors is cited by the literature of a third author at the same time, the two authors are said to have a co-citation relationship. If the two authors are cited more frequently, it indicates that their academic relationship is closer and their "distance" is closer. This article gets 210566 distinct references of green environment research field between 2002 and 2022. Fig. 4 depicts a merged authors co-citation network. This network is constructed by top 100 most cited authors from each slice, and it reveals 488 authors contributed to the previous intellectual base development of green environment research.

As can be seen from Fig. 4, Porter M. E. is the biggest author node with the most co-citation articles (1393), who was one of the most respected masters of international business, and majored in competitive strategy and competitive advantage and especially the three well-known competitive strategies (overall cost leadership strategy, differentiation strategy, and focus strategy) and five forces analysis framework of competitiveness. The following two bigger author nodes are Hart S. L. (766) and Zhu Q. H. (698). Hart S. L. had contributed a lot of publications in business strategy, sustainable business, and base of the pyramid business. Zhu Q. H. had majored in green supply chain management, corporate social responsibility and remanufacturing management. Moreover, Carroll A. B., Bansal P., Freeman R. E., Kolka A., and Sharma S. also had contributed more than 500 publications in enterprise green environment field. More interestingly, Poter M. E., Sharma S., Sarkis J. and Klassen R. D. had close scientific research collaboration relationships. They formed a strong research team. Tab. 3 lists top10 most cited pioneers in

enterprise green environment field. The main research directions of the authors coincide with the macro-level analysis of discipline categories (see section "Discipline Distribution") and journal categories (see section "Journal Co-citation Analysis"). Similar to the previous section, the noteworthy nodes with red inner tree rings reveal a dramatic increase in co-citation authors during a certain period. These co-cited authors may have played a huge role or profound influence in green environment research. For example, Welford R. with the strongest citation burst 23.4061 between 2007 and 2012, followed by Prahalad C. K., Margolis J. D. and Govindan K. These authors will maybe become new pioneers with profound future effects on the development of enterprise green environment research.

Figure 4 Authors co-citation network

Table 3 Top10 most co-cited pioneers

Author	Main Research Directions	Freq.	Burst
Porter ME	competition, strategy, economic development	1393	3.08
Hart SL	strategy, sustainable enterprise and base of the Pyramid Business	766	
Zhu QH	green supply chain management, CSR and Remanufacturing Management	698	
Carroll AB	global business ethics, stakeholder management, and business-and-society	632	
Bansal P	general management, sustainability and strategy	571	
Freeman RE	ethics and strategic management	515	
Kolk A	international business & CSR/ sustainability	507	
Sharma S	management, sustainability and strategy	505	6.81
Elkington J	corporate responsibility and sustainable capitalism	494	

Source: Personal home page and Google scholar

4.4 Keyword Co-word Analysis

Keywords are the core of a paper summary, the paper keyword analysis can be a glimpse of the topic of the article. Several key words given in a paper must have some correlation, and this correlation can be expressed by the frequency of co-occurrence. It is generally believed that the more lexical pairs appear in the same literature, the closer the relationship between these two topics will be. Keyword co-word analysis can be used to find research hotspots and explore research fronts [43].

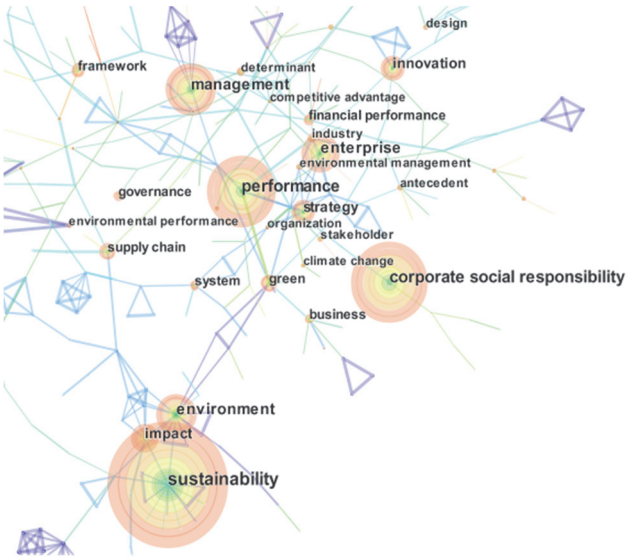

Figure 5 Keywords co-citation network

Fig. 5 shows a keywords co-citation network. Each node and the size represent each core keyword and its importance, and the thickness of the lines between two nodes represents the link strength. It is not surprising that some words, like green, firm, enterprise, and environment, have higher co-citation frequency. But these words must be ignored because of search terms. However, some words, like sustainability, corporate social responsibility, performance, management, strategy, impact, innovation, model/framework, system, governance, and soon, suggest some higher research focuses in these areas. Among them, sustainability research involves environment, impact, economic, advanced manufacturing mode, et al. Corporate social responsibility research involves suggestion, and stakeholder engagement. Performance research involves enterprise/organization performance, environmental performance, financial performance, and economic performance, et al. In addition, some words, such as supply chain, industry, competitive advantage, eco innovation, behaviour, organization, can reveal current emerging research hotspots. Besides these words, "China" deserves to be clearly pointed out as an interesting finding in green environment research. China is concerned mainly due to population and pollution growth [44]. Therefore, scholars worldwide perform more researches on the increasing development of green environment and green management [45-48]. These results of keyword co-citation network analysis coincide with the results of discipline categories (see section "Discipline Distribution") and the authors' main research directions (see Tab. 3 "Top10 most co-cited pioneers" in section "Author Co-citation Analysis"). The noteworthy nodes with red inner tree rings indicate that these keywords have the strongest citation bursts in a certain period. According to burst analysis, natural environment has a strongest citation burst of 14.6459 from 2003 to 2013, followed by knowledge management from 2005 to 2015 and strategic management from 2007 to 2014. Besides, corporate environmentalism, green marketing, corporate responsibility and stakeholder engagement also deserve attention. The above keywords will maybe turn to new intellectual turning point research directions of enterprise green environment research [3].

5 CONCLUSIONS

In culmination, the comprehensive science mapping analysis conducted on enterprise green environment research has yielded a tapestry of invaluable insights. Delving into this expansive terrain, we have unveiled a host of noteworthy findings that enrich our understanding of this pivotal domain: Dominant Disciplinary Avenues. The contours of green environment research enterprise have been distinctly etched across various disciplines. Foremost among these are Business & Economics, Environmental Sciences/Studies, Business & Management, and Green Sustainable Science Technology. These disciplines serve as the bedrock upon which the edifice of knowledge and exploration in this realm rests.

Pinnacle Journals of Influence. The conduits of scholarly discourse that command influence within the sphere of green environment enterprise are notable. Notable among these citadels of erudition are the Journal of Cleaner Production, Journal of Business Ethics, Strategic Management Journal, Academy of Management Review, Business Strategy and the Environment, Academy of Management Journal, Corporate Social Responsibility and Environmental Management, International Journal of Production Economics, Harvard Business Review, and Sustainability. These journals collectively shape and disseminate the cutting-edge tenets of enterprise green environment exploration.

Authorship Landscape. An intricate network of author co-citation analysis has unveiled the luminary figures whose contributions stand as cornerstones of enterprise green environment research. At the forefront, luminaries such as Porter ME emerge as respected authorities in the realms of international business, competitive strategy, and advantage. Notably, Hart SL assumes a mantle of authority in navigating the interplay between environmental concerns, poverty, and business strategy. The profiles of Welford R, Prahalad CK, Margolis JD, and Govindan K radiate with the potential to blaze new trails, portending profound future influence in the realm of enterprise green environment research.

Thematic Trajectories. A key co-word analysis has unveiled the thematic currents that course through the enterprise green environment research tapestry. Themes of sustainability, performance, corporate social responsibility, supply chain dynamics, competitive advantage, green marketing, innovation, and organizational paradigms reverberate prominently. Moreover, the discourse has been stirred by the hot-button topic of China's role in the enterprise green environment discourse, underscoring its global implications.

Novel Insights and Pathways. Importantly, this study unfurls a vivid tableau of enterprise on green environment research, distinct in its contours from prior investigations. Through the intricate interplay of co-word analysis and co-citation analysis, scholars are endowed with a panoramic vista that facilitates swift comprehension of the prevailing research landscape. This newfound clarity extends to the delineation of disciplinary distribution, pioneering luminaries, and the current effervescent epicenters of research activity. It, in turn, paves a traversable path toward future research trajectories, fostering a cyclical evolution of scholarly pursuit. By amalgamating bibliometric networks, this endeavor not only augments our comprehension of the enterprise of green environment domain but also stands as a linchpin for scholarly advancement and practical applications. It possesses the potency to galvanize a transformative metamorphosis in the realms of research, development, and practical implementation within the sphere of green environment enterprise. Furthermore, it holds the promise of enhancing the protocol for generating systematic reviews in this domain, bestowing a reliable quantitative lens upon the contours of green environment research enterprise. In closing, this study stands as a beacon that illuminates the path to a future wherein the harmonious coexistence of enterprise and environment is not just a conceptual aspiration, but a tangible and sustainable reality.

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6 REFERENCES

[1] Cilliers, E. J., Diemont, E., Stobbelaar, D. J., & Timmermans W. (2010). Sustainable Green Urban Planning: The Green Credit Tool. *Journal of Place Management and Development*, *3*(1), 57-66. https://doi.org/10.1108/17538331011030275

[2] Noah, W. & Bradley, W. (1994). It's Not Easy Being Green. *Harvard Business Review*, *72*(3), 46-52.

[3] Liu, W., Tsai, S., Wu, C., Shao, X., & Wacławek, M. (2022). Corporate Environmental Management and Sustainable Operation: Theory and Application. *Ecological Chemistry and Engineering S*, *29*(3), 283-285. https://doi.org/10.2478/eces-2022-0020

[4] Wu, C., Tsai, S., Liu, W., Shao, X., Xia, Y., & Wacławek, M (2021). Green environment and sustainable development: methods and applications. *Ecological Chemistry and Engineering S*, *28*(4), 467-470. https://doi.org/10.2478/eces-2021-0030

[5] Wgrzyn, M., Rudnik, E., Kamocka-Bronisz, R., & Bożena, K. (2021). Mechanical and Thermal Properties of Biocomposites Based on Polyethylene from Renewable Resources Modified with Ionic Liquids. *Journal of Polymers and the Environment*, *29*(6), 1808-1816. https://doi.org/10.1007/s10924-020-01993-4

[6] Tu, J. C. & Huang, H. S. (2015). Analysis on the Relationship between Green Accounting and Green Design for Enterprises. *Sustainability*, *7*(5), 6264-6277. https://doi.org/10.3390/su7056264

[7] Cilliers, E. J., Diemont, E., Stobbelaar, D. J., & Timmermans, W. (2011). Sustainable Green Urban Planning: The Workbench Spatial Quality Method. *Journal of Place Management and Development*, *4*(2), 214-224. https://doi.org/10.1108/17538331111153197

[8] Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green Supply Chain Management in China: Pressures, Practices and Performance. *International Journal of Operations and Production Management*, *25*(5), 449-468. https://doi.org/10.1108/01443570510593148

[9] Shaikh, F. K., Zeadally, S., & Exposito, E. (2017). Enabling Technologies for Green Internet of Things. *IEEE Systems Journal*, *11*(2), 983-994. https://doi.org/10.1109/JSYST.2015.2415194

[10] Tran, T. K. P. (2022). The impact of destination image, environmental beliefs on attitude and willingness to pay for green hotel. *Journal of System and Management Sciences*, *12*(3), 253-270. https://doi.org/10.33168/JSMS.2022.0313

[11] Taleb, M. & Pheniqi, Y. (2023). Linking green human capital, green transformational leadership, green dynamic capabilities, and green innovation: a moderation model. *Journal of System and Management Sciences*, *13*(3), 102-127. https://doi.org/10.33168/JSMS.2023.0308

[12] Sedehzadeh, S. & Deifbarghy, M. (2021). Redesigning a Closed Loop Food Supply Chain Network Considering Sustainability and Food Banks with Different Returns. *Economic Computation and Economic Cybernetics Studies And Research*, *55*(4), 89-100. https://doi.org/10.24818/18423264/55.4.21.06

[13] Katariya, D. & Shukla, K. (2022). Sustainable Economic Production Quantity (SEPQ) Model for Inventory Having Green Technology Investments - Price Sensitive Demand with Expiration Dates. *Economic Computation And Economic Cybernetics Studies And Research*, *56*(3), 135-152. https://doi.org/10.24818/18423264/56.3.22.09

[14] Chen, C. (2017). Science Mapping: A Systematic Review of the Literature. *Journal of Data and Information Science*, *2*(2), 1-40. https://doi.org/10.1515/jdis-2017-0006

[15] Hassini, E., Surti, C., & Searcy, C. (2012). A Literature Review and a Case Study of Sustainable Supply Chains with a Focus on Metrics. *International Journal of Production Economics*, *140*(1), 69-82. https://doi.org/10.1016/j.ijpe.2012.01.042

[16] Elshaer, I. A., Azazz, A. M. S., Ameen, F. A., & Fayyad, S. (2023). Sustainable Horticulture Practices to Predict Consumer Attitudes towards Green Hotel Visit Intention: Moderating the Role of an Environmental Gardening Identity. *Horticulturae*, *9*(1), 31. https://doi.org/10.3390/horticulturae9010031

[17] Linnenluecke, M. K. & Griffiths, A. (2013). Firms and Sustainability: Mapping the Intellectual Origins and Structure of the Corporate Sustainability Field. *Global Environmental Change-Human and Dimensions*, *23*(1), 382-391. https://doi.org/10.1016/j.gloenvcha.2012.07.007

[18] Ma, R. & Ho, Y. S. (2016). Comparison of Environmental Laws Publications in Science Citation Index Expanded and Social Science Index: a Bibliometric Analysis. *Scientometrics*, *109*(1), 227-239. https://doi.org/10.1007/s11192-016-2010-6

[19] Thome, T., Marcio, A., Scavarda, A., & Ceryno, P. S. (2016). Sustainable New Product Development: a Longitudinal Review. *Clean Technologies and Environmental Policy*, *18*(7), 2195-2208. https://doi.org/10.1007/s10098-016-1166-3

[20] Chen, C. (2006). CiteSpace II: Detecting and Visualizing Emerging Trends and Transient Patterns in Scientific Literature. *Journal of the American Society for Information Science and Technology*, *57*(3), 359-377. https://doi.org/10.1002/asi.20317

[21] Wise, J. A. (1999). The Ecological Approach to Text Visualization. *Journal of the American Society for Information Science*, *50*(13), 1224-1233. https://doi.org/10.1002/(SICI)1097-4571(1999)50:13<1224::AID ASI8>3.0.CO;2-4

[22] Bishop, P. C. (2006). Tech Mining: Exploiting New Technologies for Competitive Advantage. *Technology Forcasting and Social Change*, *73*(1), 91-93. https://doi.org/10.1016/j.techfore.2005.08.001

[23] Bailón-Moreno, R., Jurado-Alameda, E., & Ruíz-Baños, R. (2006). The Scientific Network of Surfactants: Structural Analysis. *Journal of the American Society for Information Science and Technology*, *57*(7), 949-960. https://doi.org/10.1002/asi.20362

[24] Bailón-Moreno, R., Jurado-Alameda, E., & Ruíz-Baños, R., & Courtial, J. P. (2005). Analysis of the Scientific Field of Physical Chemistry of Surfactants with the Unified Scienctometric Model. Fit of Relational and Activity Indicators. *Scientometrics*, *63*(2), 259-276.

[25] Leydesdorff, L. & Schank, T. (2008). Dynamic Animations of Journal Maps: Indicators of Structural Changes and Interdisciplinary Developments. *Journal of the American Society for Information Science and Technology*, *59*(11), 1810-1818. https://doi.org/10.1002/asi.20891

[26] Persson, O., Danell, R., & Wiborg Schneider, J. (2009). How to Use Bibexcel for Various Types of Bibliometric Analysis. *Proceedings of International Society for Scientometrics and Informetrics*, Leuven, Belgium, 9-24.

[27] Sci2 Team. (2009). Science of Science (Sci2) Tool. Indiana University and SciTech Strategies

[28] Eck, N. J. V. & Waltman, L. (2010). Software Survey: Vosviewer, a Computer Program for Bibliometric Mapping. *Scientometrics*, *84*(2), 523-538. https://doi.org/10.1007/s11192-009-0146-3

[29] Börner, K., Huang, W., Linnemeier, M., Duhon, R. J., Phillips, P., Ma, N., Zoss, A. M., Guo, H., & Price, M. A. (2010). Rete-netzwerk-red: Analyzing and Visualizing Scholarly Networks Using the Network Workbench Tool. *Scientometrics*, *83*(3), 863-876. https://doi.org/10.1007/s11192-009-0149-0

[30] Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2012). SciMAT: A New Science Mapping Analysis Software Tool. *Journal of the American Society for Information Science and Technology*, *63*(8), 1609-1630. https://doi.org/10.1002/asi.22688

[31] Meho, L. I. & Yang, K. (2007). Impact of Data Sources on Citation Counts and Rankings of LIS Faculty: Web of Science Versus Scopus and Google Scholar. *Journal of the American Society for Information Science and Technology*, *58*(13), 2105-2125. https://doi.org/10.1002/asi.20677

[32] No, H. Y., An, Y., & Park, Y. (2015). A Structured Approach to Explore Knowledge Flows through Technology-based Business Methods by Integrating Patent Citation Analysis and Text Mining. *Technological Forecasting and Social Change*, *97*, 181-192. https://doi.org/10.1016/j.techfore.2014.04.007

[33] Gu, D., Li, J., Li, X., & Liang, C. (2017). Visualizing the Knowledge Structure and Evolution of Big Data Research in Healthcare Informatics. *International Journal of Medical Informatics*, *98*(2), 22-32. https://doi.org/10.1016/j.ijmedinf.2016.11.006

[34] Samoylenko, I., Chao, T. C., & Liu, W. C. (2006). Visualizing the Scientific World and Its Evolution. *Journal of the American Society for Information Science and Technology*, *57*(11), 1461-1469. https://doi.org/10.1002/asi.20450

[35] Callon, M., Courtial, J. P., Turner, W. A., & Bauin, S. (1983). From Translations to Problematic Networks - an Introduction to Co-word Analysis. *Social Science Information*, *22*(2), 191-235. https://doi.org/10.1177/053901883022002003

[36] Small, H. (1973). Co-citation in the Scientific Literature: A New Measure of the Relationship between Two Documents. *Journal of the American Society for Information Science*, *24*(4), 265-269. https://doi.org/10.1002/asi.4630240406

[37] Navonil, M., Nik, B., Simon J. E. T., & Sotiriadis, S. (2013). Exploring the E-science Knowledgebase through Co-citation Analysis. *Procedia Computer Science*, *19*, 586-593. https://doi.org/10.1016/j.procs.2013.06.078

[38] Chen, C. (1999). Visualising Semantic Spaces and Author Co-citation Networks in Digital Libraries. *Information Processing & Managemen*t, *35*(2), 401-420. https://doi.org/10.1016/S0306-4573(98)00068-5

[39] White, H. D. & McCain, K. W. (1998). Visualizing a Discipline: An Author Co-citation Analysis of Information Science, 1972-1995. *Journal of the American Society for Information Science*, *49*(4), 327-356. https://doi.org/10.1002/(SICI)1097-4571(19980401)49:4<327::AIDž-ASI4>3.0.CO;2-4

[40] Johnson, B. & Shneiderman, B. (1991). Tree-maps: A Space Filling Approach to the Visualization of Hierarchical Information Structures. *Proceedings of the 2nd conference on Visualization '91*, San Diego, CA, USA, 284-291. https://doi.org/10.1109/VISUAL.1991.175815

[41] Herman, I., Melançon, G., & Marshall, M. S. (2000). Graph Visualization and Navigation in Information Visualization: A Survey. *IEEE Transactions on Visualization and Computer Graphics*, *6*(1), 24-44. https://doi.org/10.1109/2945.841119

[42] Morris, S. A., Yen, G., Wu, Z., & Asnake, B. (2003). Time line visualization of research fronts. *Journal of the American Society for Information Science & Technology*, *54*(5), 413-422. https://doi.org/10.1002/asi.10227

[43] Callon, M., Courtial, J., & Laville, F. (1991). Co-word Analysis as a Tool for Describing the Network of Interactions Between Basic and Technological Research The Case of Polymer Chemistry. *Scientometrics, 22*(1), 155-205. https://doi.org/10.1007/BF02019280

[44] Nobre, G. C. & Tavares, E. (2017). Scientific Literature Analysis on Big Data and Internet of Things Applications on Circular Economy: a bibliometric study. *Scientometrics***,** *111*, 463-492. https://doi.org/10.1007/s11192-017-2281-6

[45] Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green Supply Chain Management in China: Pressures, Practices and Performance. *International Journal of Operations & Production Management*, *25*(5), 449-468. https://doi.org/10.1108/01443570510593148

[46] Li, H., Chen, W., & He, W. (2015). Planning of Green Space Ecological Network in Urban Areas: An Example of Nanchang, China. *International Journal of Environmental Research and Public Health*, *12*(10), 12889-12904. https://doi.org/10.3390/ijerph121012889

[47] Liu, T., Deng, Y., & Chan, F. (2018). Evidential Supplier Selection Based on DEMATEL and Game theory. *International Journal of Fuzzy Systems*, *20*(4), 1321-1333. https://doi.org/10.1007/s40815-017-0400-4

[48] Ge, B., Jiang, D., Gao, Y., & Tsai, S. B. (2016). The Influence of Legitimacy on a Proactive Green Orientation and Green Performance: A Study Based on Transitional Economy Scenarios in China. *Sustainability*, *8*, 1344. https://doi.org/10.3390/su8121344

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