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ATTRIBUTES OF A SUSTAINABLE CO-WORKING SPACE - A PRISMA REVIEW

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Abstract:

The transition towards sustainable workspaces has gained momentum in recent years, particularly with the rising popularity of co-working spaces as flexible and shared environments that support wellbeing, collaboration, and environmental sustainability. Despite this growth, no comprehensive framework currently consolidates the physical attributes of a sustainable co-working space. This review addresses this gap by systematically analysing existing literature to uncover the core elements that contribute to the sustainability of co-working spaces. This study aims to define the physical attributes of an environmentally sustainable co-working space by applying an advanced search strategy using the Scopus and IEEE Xplore databases, focusing on publications with keywords such as "sustainable space", "co-working space", "green environment", and their synonyms. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework guided the screening and selection process, which resulted in a final dataset of 55 relevant articles. Through qualitative thematic analysis of the abstracts, four dominant themes emerged: (1) Green Environment, which includes thermal comfort, indoor air quality, acoustic control, and natural light; (2) Green Materials, highlighting the importance of recycled, low-carbon, and environmentally-friendly construction

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materials; (3) Open Layout, emphasizing flexible and collaborative spatial arrangements that enhance social interaction and space efficiency; and (4) Smart Technology, referring to the integration of IoT systems and data-driven solutions that optimize energy use and user experience. The findings suggest that a combination of these attributes is important in creating high-performance, user-centred, and environmentally responsible co-working spaces. This review provides a foundation for future research and practice in sustainable co-working space design to architects, developers, and policymakers who are seeking to promote healthier and more resilient shared work environments. This is the first study to define the physical attributes of a sustainable co-working space.

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Keyword:

Co-Working Space, Green Building, Sustainable Space

Introduction

The landscape of modern work is expanding, fuelled by increasing demands for flexibility, collaboration, and community. This has pushed co-working spaces from a niche concept to a global phenomenon. These shared work environments offer amenities ranging from flexible desks to private offices, and have become pivotal in supporting diverse professional needs including freelancers, startups, and established corporations that are seeking agile solutions (Ayodele et al., 2022; DuPriest, 2019). Co-working spaces are not only important for its infrastructure, but also for its capacity in fostering innovation, facilitating networking, and cultivating a sense of belonging among its members (Berdicchia et al., 2023; Bouncken et al., 2020). However, as the co-working industry matures, the need for sustainability becomes important, contributing to the Triple Bottom Line (TBL) framework, encompassing environmental responsibility, social equity, and economic viability (Tremblay & Scaillerez, 2020; Vaddadi et al., 2020; Wei et al., 2021). Environmental psychology in workplace design emphasizes the impact of the physical environment on human behaviour, wellbeing, and productivity. Sustainable co-working spaces can positively influence these factors through design and layout, personal control and privacy, and positive psychology (Grant et al., 2019; Pan et al., 2024; Wackernagel, 2017). A sustainable co-working space is not merely an eco-friendly building; it is a holistic ecosystem that supports the long-term wellbeing of its users, the community it serves, and the planet, aligning with sustainable built environment theory (Akadiri et al., 2012; Sylva & Iyer-Raniga, 2023; Yildirim et al., 2023). Understanding the multifaceted attributes that contribute to this sustainability is important for the continued growth and positive impact of the co-working industry, ensuring its relevance and resilience in a constantly growing professional world.

Existing research on co-working spaces has largely focused on their immediate benefits, such as increased productivity and enhanced social interaction (Bueno et al., 2018; Gerdenitsch et al., 2016). Pioneering studies provided early insights into the collaborative dynamics and spatial configurations of co-working, highlighting its move from traditional office models (Moriset, 2014; Spinuzzi et al., 2019). More recent studies have explored the psychological wellbeing of co-workers and the role of community managers in fostering vibrant environments (Akhavan & Mariotti, 2023; Eves et al., 2018). While these contributions have significantly advanced our understanding of co-working's operational and social dimensions, there is a lack of studies on sustainability attributes. Research into 'green' co-working spaces has touched on the attitudes and practices of users, but not the physical attributes of the spaces. This gap is particularly evident in the lack of studies that systematically analyse how the use of sustainable materials and sustainable design contributes to the positive impact of co-working spaces.

Despite the growing recognition of the importance of sustainability, several critical gaps appear within the co-working literature with regards to its sustainable attributes. Firstly, there is no framework for assessing the sustainability of co-working spaces. This lack of guidance hinders the development of best practices. Secondly, while some studies suggest social sustainability through community building, the specific mechanisms and long-term impacts of these efforts towards users are not thoroughly explained. Future research should focus on developing a robust and multi-dimensional sustainability framework specifically for co-working spaces that include not only environmental sustainability, but also social inclusivity and economic resilience. Furthermore, longitudinal studies are needed to understand the long-term impacts of various co-working models on user wellbeing, social interaction, and environmental performance. Recommendations for the industry include adopting transparent reporting on sustainability metrics, investing in renewable energy solutions, and fostering deeper partnerships with local communities. These efforts will not only improve the positive impact of co-working spaces but also ensure its continuous relevance as a cornerstone of the future of work.

Literature Review

While there has not been a specific framework from literature describing sustainable co-working spaces, some studies describe sustainable aspects in co-working spaces. A summary of the literature review is presented in Table 1. One of the aspects studied is indoor environmental quality (IEQ), which significantly impacts the health, wellbeing, and productivity of its occupants. Key environmental factors include air quality, temperature, humidity, and lighting. Studies have shown that higher satisfaction with IEQ correlates with better wellbeing and fewer respiratory symptoms among workers (Parhizkar et al., 2023). Continuous environmental monitoring, such as measuring CO2 and particulate matter (PM2.5) levels, is important for maintaining optimal IEQ and ensuring a healthy workspace. Additionally, Labib et al. (2022) highlight the incorporation of green building standards like LEED, which emphasize resource efficiency and minimal environmental impact.

Sustainable co-working spaces also focus on fostering a sense of community and social responsibility among their members. This includes promoting sustainable mobility options and encouraging socially responsible behaviours (Oswald & Zhao, 2020). The concept of co-housing, which shares similarities with co-working spaces, supports pro-environmental behaviour by enabling residents to adopt and reinforce sustainable practices collectively (Marckmann et al., 2012). Furthermore, the design and operation of these spaces should consider the wellbeing of occupants, integrating ergonomic workstations and stress-reducing elements to enhance overall productivity and satisfaction (Zvyagina et al., 2019). From an economic perspective, sustainable co-working spaces aim to balance environmental stewardship with economic viability. This involves creating spaces that attract and retain businesses and skilled workers by offering a high-quality, sustainable work environment (George et al., 2012). Implementing sustainable practices, such as efficient resource use and waste reduction, can also lead to cost savings and improved operational efficiency (Labib et al., 2022). Additionally, the integration of sustainability into the organizational culture, as seen in educational institutions adopting the GRACIAS model (Green Resolution in Academic Campuses for Intellectually Aware Sustainability), highlights the importance of a holistic approach to sustainability that encompasses all levels of management and operations (Chourey et al., 2024).

This literature review highlights the multifaceted nature of environmentally sustainable co-working spaces, emphasizing the importance of environmental quality, community engagement, and economic viability. By integrating these attributes, co-working spaces can create healthier, more productive, and sustainable environments for their occupants.

Table 1: Summary of Literature Review on Sustainable Aspects in Co-Working Spaces

Item	Description	Supporting Abstracts
Indoor Environmental Quality (IEQ)	Focus on air quality, temperature, humidity, and lighting to enhance health and productivity.	Labib et al. (2022); Parhizkar et al. (2023)
Green Building Standards	Adoption of standards like LEED for resource efficiency and minimal environmental impact.	Labib et al. (2022)
Community and Social Responsibility	Promotion of sustainable mobility and socially responsible behaviours among members.	Marckmann et al. (2012); Oswald & Zhao (2020)
Ergonomic and Stress-Reducing Design	Integration of ergonomic workstations and elements to reduce stress and enhance wellbeing.	Zvyagina et al. (2019)
Economic Viability	Balancing environmental stewardship with economic benefits to attract and retain businesses.	George et al. (2012)
Holistic Sustainability Approach	Incorporation of sustainability into organizational culture and operations.	Chourey et al. (2024)

Materials and Methods

The study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework for identifying, screening, and determining eligibility of records. Consequently, ATLAS.ti was employed to perform a qualitative thematic analysis on the final set of documents. The PRISMA flow diagram is shown in Figure 1.

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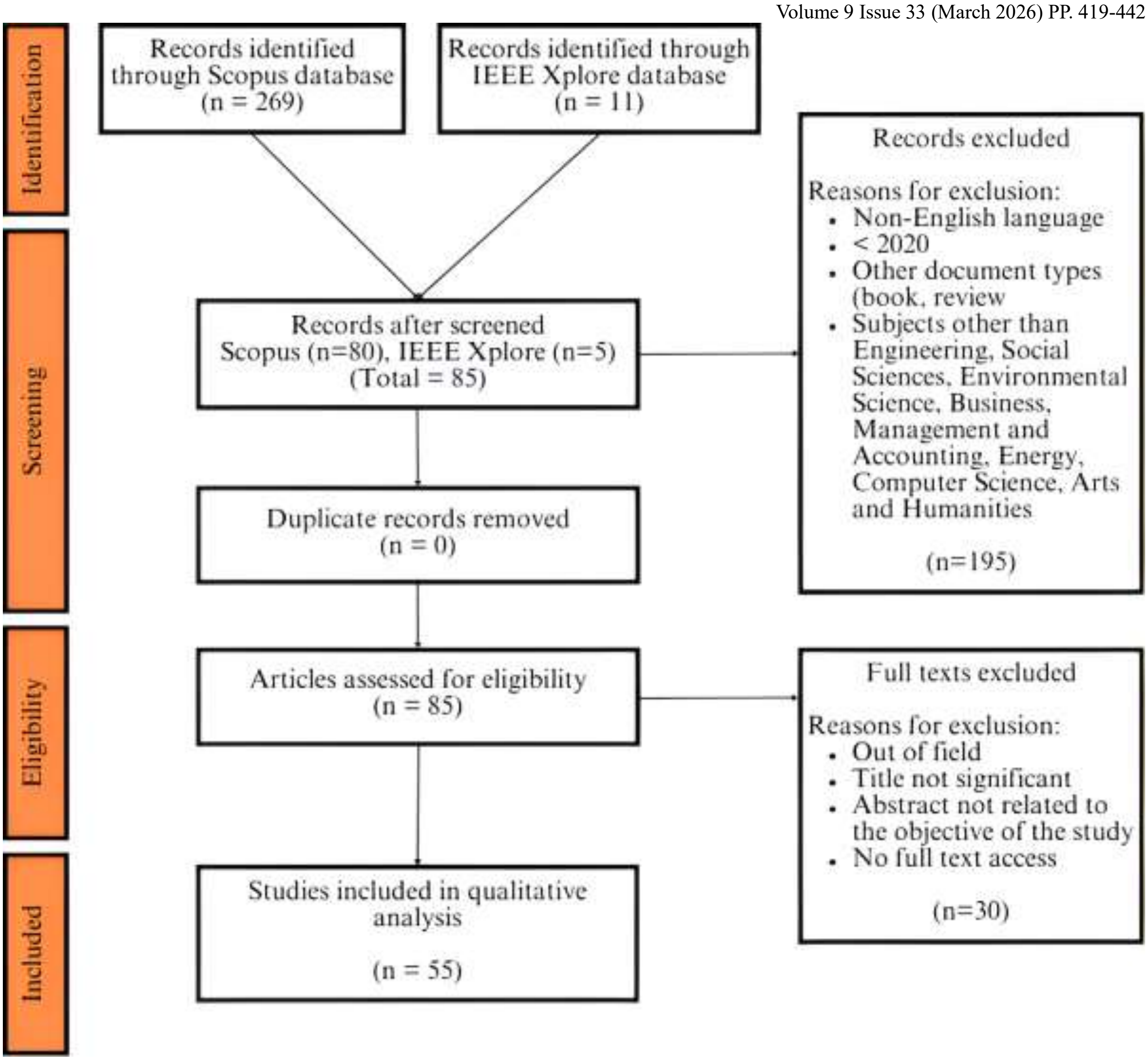

Figure 1: PRISMA Flow Diagram of the Procedure for Selecting Articles for Qualitative Analysis

Source: Adapted from Moher et al. (2009)

Identification

According to the PRISMA framework, the Identification stage marks the critical first step in systematically gathering relevant literature (Moher et al., 2009). In this study, comprehensive searches were conducted across two reputable academic databases (Scopus and IEEE Xplore) to ensure a robust foundation of high-quality sources related to sustainable attributes of co-working spaces. As shown in Table 2, the Scopus search was done using a search string combining various terminologies for co-working spaces and sustainability-related concepts, limited to English-language journal articles and conference papers published between 2020 and 2025. The search was further refined by focusing on subject areas relevant to engineering, social sciences, environmental science, energy, business, arts, and computer science. This search yielded a total of 269 records from Scopus. Next, the IEEE Xplore database was employed using an identical keyword strategy. IEEE Xplore is well regarded for its focus on engineering and technological research. This search returned a smaller number of records (n = 11). The search from both databases returned a combined total of 280 records.

Table 2: Search String Used on Each Database

Database	Search string
Scopus	TITLE-ABS-KEY (("coworking space" OR "coworking office" OR "flexible workspace" OR "flexible office" OR "cosharing space" OR "cosharing office" OR "cosharing workspace" OR "activity based office" OR "activity based workspace" OR "open plan office" OR "open plan workspace") AND (sustain* OR green OR "eco friendly" OR "environmentally friendly" OR "low carbon" OR "energy efficient" OR sunlight OR "natural light" OR daylight OR recycle OR reuse OR reusable OR reclaim)) AND PUBYEAR > 2019 AND PUBYEAR < 2026 AND (LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "ENER") OR LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "COMP")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp")) Date of Access: July 2025
IEEE Xplore	("coworking space" OR "coworking office" OR "flexible workspace" OR "flexible office" OR "cosharing space" OR "cosharing office" OR "cosharing workspace" OR "activity based office" OR "activity based workspace" OR "open plan office" OR "open plan workspace") AND (sustain* OR green OR "eco friendly" OR "environmentally friendly" OR "low carbon" OR "energy efficient" OR sunlight OR "natural light" OR daylight OR recycle OR reuse OR reusable OR reclaim) Date of Access: July 2025

Source: Authors' owns work

Screening

In the Screening stage of the PRISMA framework, the initially identified 280 records were screened to ensure that only the most relevant and high-quality studies were included in the review. After applying eligibility criteria, a total of 85 articles were retained for further analysis (80 articles from Scopus and 5 articles from IEEE Xplore). A summary of the inclusion and exclusion criteria is shown in Table 3. The exclusion of 195 records was based on several key parameters, namely language (non-English), publication type (books, reviews), publication year (prior to 2020), and subject area (subjects other than engineering, social sciences, environmental science, business, energy, computer science, and arts and humanities). These criteria were set to ensure alignment with the study's scope, which focuses on interdisciplinary and contemporary research related to sustainable co-working environments. By enforcing these standards, the screening process ensures the relevance, accessibility, and methodological consistency of the selected articles (Phillips & Barker, 2021). The decision to exclude reviews and non-journal articles was to support the aim of this study, which is to analyse original empirical and conceptual research rather than secondary interpretations or theoretical overviews.

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Table 3: Inclusion and Exclusion Criteria in the Screening Process

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2020 - 2025	< 2020
Literature type	Journal articles, conference papers	Books, reviews
Subject	Engineering, Social Sciences, Environmental Science, Business, Management and Accounting, Energy, Computer Science, Arts and Humanities	Other subjects

Source: Authors' own work

Eligibility

The eligibility stage of the PRISMA framework involved a more detailed examination of the 85 screened articles, focusing on their relevance and alignment with the study's objectives. At this stage, full-text articles were retrieved and assessed based on four primary exclusion criteria: i) content deemed outside the field of sustainable co-working spaces, ii) titles lacking thematic significance, iii) abstracts unrelated to the study's core objective, and iv) full text was not accessible. As a result, 30 articles were excluded, leaving 55 high-quality articles eligible for in-depth analysis.

Data Extraction and Analysis

The final set of 55 articles were downloaded as Portable Document Format (PDF) files. The files were then uploaded onto ATLAS.ti 25 software (Desktop version) for coding and thematic analysis. Each article was scrutinized for descriptions of sustainable physical attributes of a co-working space. These descriptions were then highlighted (in ATLAS.ti, the highlighted segments are termed as 'quotations'). All quotations were then grouped according to their relevant themes (in ATLAS.ti, themes are termed as 'codes'). Themes were developed using inductive reasoning, i.e. the attributes were first extracted from the articles, and then themes were developed based on the type of attributes. For example, where segments of the document described the use of recycled building materials, it would be coded as 'Green Resources'. If a segment described open-plan layouts, it would be coded as 'Open Layout'. Overall, four themes emerged from the analysis, namely 'Green Environment', 'Green Resources', 'Open Layout', and 'Smart Technology'.

Additionally, a second set of themes emerged from the analysis. These themes highlighted the impact of the sustainable attributes towards the users, namely 'Mental Health', 'Human Interaction', 'Wellbeing', and 'Productivity'. Similarly, where relevant, the codes (themes) were systematically applied to the appropriate segments of the documents. For example, where segments of the document described the impact towards mental health of office users, the segment would be highlighted and coded as 'Mental Health'.

Following the quotation codings, a pattern analysis was conducted to examine the co-occurrence of codes between the first set of themes (green environment, green resources, open layout, and smart learning technology) and the second set of themes (mental health, human interaction, wellbeing, and productivity).

Findings and Discussion

Despite minimal research on sustainable co-working spaces, it shows promising growth. Based on the search results, 55 articles were extracted and analysed. Four main themes emerged from the analysis: first, open layouts (25 articles), discussing how spatial configurations, workplace flexibility, and occupancy dynamics influence sustainability in co-working spaces; second, green environment (29 articles), discussing attributes related to the surroundings of a co-working space, including thermal comfort, daylight quality, and biophilic elements; third, green resources (12 articles), discussing sustainable building materials and resources in co-working spaces, including recycled materials and sustainable lighting; and fourth, smart technology (12 articles), discussing digital systems, automation, and intelligent design interventions in co-working spaces, summarized in Table 4. From the 55 articles, 26 articles discussed the impact of one or more themes towards users, which are mental health (10 articles), productivity (13 articles), and human interaction (3 articles). Based on these findings, the relationship between open layout, green environment, green resources, and smart technology with human interaction, mental health, and productivity is visualized in Figure 2. From Figure 2, it can be seen that all the sustainable attributes of a co-working space are interconnected with the impact towards users. These findings collectively underscore the importance of integrated environmental design in co-working spaces to support occupant wellbeing, comfort, and productivity.

Table 4. Articles Resulting from the PRISMA Method and their Associated Themes

Author(s)	Attribute theme				Impact		
	Open layout	Smart technology	Green environment	Green resources	Human interaction	Mental health	Productivity
Laiche et al. (2023)			●			●	
Cruz, Franqueira and Pombo (2021)				●			
Tuniki et al. (2025)			●				
Whyte et al. (2024)				●		●	●
Hammes et al. (2022)	●			●			
Najafi et al. (2023)			●				
Zhang et al. (2025)			●				
Yu et al. (2023)			●				
Bielskus and Motuzienė (2020)	●						
Kucukali (2025)	●			●			
Aliparast and Onaygil (2024a)				●			●
Heng (2021)	●		●				
Flipo, Lejoux and Ovtracht (2022)		●					
Barath and Schmidt (2022)	●						
Bressane and de Castro (2025)			●			●	●
Bergefurt, Appel-Meulenbroek and Arentze (2024)			●			●	
Bruyninckx (2023)			●				
Abdullah and Alibaba (2022)			●				
Aksamija and Milosevic (2023)			●				
Putri et al. (2022)		●					
Abdollahzadeh, Tahsildoost and Zomorodian (2020)	●		●				
Al Awadh, Elzeyadi and Nubani (2025)			●				●
Aliparast and Onaygil (2023)				●			●

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Alizadeh Kateshastabadan, Azmoodeh and Mohammadhosseini (2025)			●			●	
Anaraki et al. (2023)			●				●
Bian et al. (2021)	●		●				
Candido et al. (2021)	●		●		●	●	●
Cheung et al. (2021)	●		●				
D’Amanzo et al. (2023)			●				
Du and Sharples (2021)	●		●				
Fast and Jansson (2024)	●	●			●	●	
Heng, Lim and Ossen (2020)	●		●				
Huang et al. (2023)	●		●				●
Ikuzwe, Ye and Xia (2020)	●			●			
Ivaldi et al. (2021)	●				●		
Kent et al. (2022)	●	●					
Kwong (2020)	●		●				
Lowcay, Gunay and O’Brien (2020)	●		●				
Z Luo et al. (2021)	●	●					
Eirini Mantesi, Chmutina and Goodier (2022)				●			
McCunn and Fell (2025)				●		●	
Orel, Mayerhoffer and Chytkova (2025)		●				●	●
Pan et al. (2025)			●				●
Aliparast and Onaygil (2024b)	●	●					●
Hammes, Weninger and Zech (2024)	●	●		●			
Mathur et al. (2025)		●					
Sebayang et al. (2024)	●			●			
Seghier et al. (2024)			●				
Seyedrezaei et al. (2023)	●		●				●
J Tintiangko and Soriano (2020)		●					
Bian and Hu (2024)	●	●					
Wang et al. (2024)	●	●		●			

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Yong et al. (2022)	●		●
Zamri and Ahmad (2025)	●	●	

Source: Generated From ATLAS.Ti Software Based on 55 Articles Analyzed

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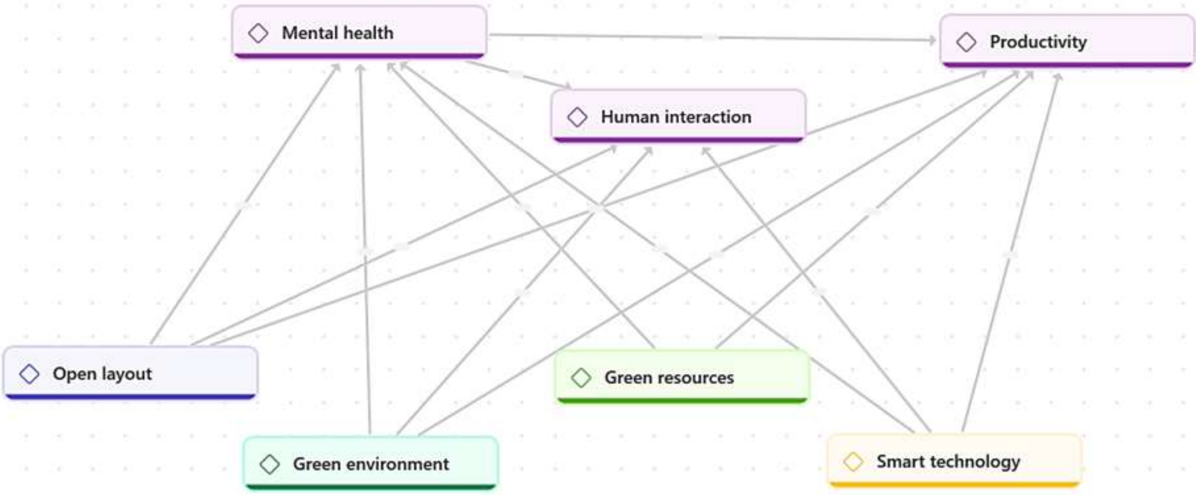

Figure 2: Network Diagram of Sustainable Co-Working Space Attributes and Impact on Users

Source: Generated From ATLAS.ti Software Based on 55 Articles Analysed

Theme 1: Open Layout

A significant number of studies discussed open-plan layouts, which is one of the main characteristics of co-working spaces. These studies demonstrate how layout decisions affect energy demand and operational efficiency, as well as shape user experiences, and organizational adaptation.

The literature highlights how open layouts contribute to broader transformations in workspace design and utilization. Fast & Jansson (2024) interpret co-working spaces as ‘comfort zones’ that reconcile digital saturation with the need for work-life balance, offering users to have social interactions and support emotional wellbeing. Meanwhile, Barath & Schmidt (2022) stress that post-pandemic work flexibility redefined employers’ perceptions of work layouts, leading to more flexible usage rather than a decline of physical offices. Complementing these findings, Ivaldi et al. (2021) highlight the role of co-working spaces as social-oriented environments, where the physical layout of co-working spaces are as important as relational and managerial practices in order to foster community. Together, these studies suggest that open layouts are not mere physical arrangements, but also represent strategies that balance organisational needs, individual autonomy, and evolving cultural expectations.

Other studies emphasize the interplay between open layouts, occupancy patterns, and sustainable performance. Candido et al. (2021) found that open layouts in co-working spaces report higher satisfaction, productivity, health outcomes, and collaboration, demonstrating that spatial flexibility combined with ergonomic and biophilic elements enhances user experiences. Similarly, Hammes et al. (2022) show that occupancy schemes strongly influence energy demand in open layouts, while Bielskus & Motuzienė (2020) identify the performance gap caused by discrepancies between actual and assumed occupancy schedules, underscoring the need to consider occupancy planning in sustainable design. Collectively, these findings indicate that open layouts have a potential to optimize both human and environmental outcomes by including adaptive usage patterns, energy efficiency, and health-oriented design principles to support the sustainable evolution of co-working spaces.

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Theme 2: Green Environment

Based on the analysis, several key findings related to the surroundings of a co-working space emerged, including thermal comfort, daylight quality, biophilic elements, and indoor environmental interactions. Given that they describe sustainable elements in the environment of a co-working space, the attributes are grouped under the ‘Green Environment’ theme.

A significant number of studies emphasized thermal comfort and adaptive behaviours in response to different climatic conditions. Tuniki et al. (2025) and Zhang et al. (2025) highlighted that occupant perceptions of thermal conditions are strongly influenced by cultural norms, climate zones, and access to personal controls. In colder climates, environmental discomfort is associated with radiant asymmetries and humidity, while warmer climates showed more behavioural adjustments. Seghier et al. (2024) complemented these findings by demonstrating how thermal performance optimization can be paired with daylight predictions to create more energy-efficiency and comfortable workspaces in tropical regions. D’Amanzo et al. (2023) further showed that passive cooling and shading strategies significantly improved thermal comfort and reduced energy demand, especially in open-plan layouts. Yu et al. (2023) identified indoor temperature, direct sunlight glare, and occupant noise as critical discomfort factors through post-occupancy evaluations and applied a multi-objective optimization model to generate retrofit strategies that enhance comfort while minimizing energy consumption. Similarly, Najafi et al. (2023) conducted simulations using multiple regression and genetic algorithms to investigate how shading and wall materials affect thermal and daylight performance, presenting parametric solutions to improve comfort in workspaces. Huang et al. (2023) proposed an innovative framework that personalizes thermal comfort by recommending flexible workspaces, where occupants can move to different areas within a building throughout the day and choose workspaces that align with their temperature preferences, thus improving comfort without added energy use. Additionally, thermal comfort emerged as a decisive factor influencing work productivity and satisfaction.

Lighting and daylight-related strategies also emerged as crucial in designing sustainable environments that also sustain psychological and physiological comfort. Al Awadh et al. (2025) and Anaraki et al. (2023) discussed how building geometry and partition design impact circadian lighting and visual access to natural light. Their work suggested that spatial configurations could be optimized using simulation-based methods to ensure better lighting outcomes, especially in open-plan workspaces. The influence of daylight on mental alertness and cognitive alignment was also evidenced in the work of Pan et al. (2025), who used occupancy data and spatial metrics to link environmental quality with user preferences and space utilization. Seyedrezaei et al. (2023) expanded on these interactions, illustrating how correlated colour temperature, noise, and temperature levels interactively influenced cognitive performance and comfort, with significant differences based on individual characteristics. Bian et al. (2021) studied skylight-induced visual discomfort in open-plan workspaces, finding that existing daylight evaluation metrics may not apply in core zones and proposing simulation-guided skylight retrofit designs. Heng (2021) examined how integrating shading devices with light pipe systems can distribute daylight more evenly, identifying optimal blind angles to enhance illumination in workspaces. Aksamija & Milosevic (2023) incorporated both daylighting and user-centred spatial adjustments into hybrid office renovations, using computational models and user feedback to improve functionality and daylight access.

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The interaction between indoor environment quality (IEQ) factors, particularly temperature, lighting, and acoustics, strongly influences psychological and physiological wellbeing in coworking spaces. Yong et al. (2022) evaluated thermal comfort and air quality in a green-certified workspace, finding high adaptation rates among occupants and adequate ventilation. They also found that thermal comfort influenced work productivity. Laiche et al. (2023) discovered that behavioural and design environments in green workspaces significantly affect quality of life, while Abdullah & Alibaba (2022) showed that optimizing open-plan workspaces to promote natural ventilation reduces reliance on HVAC systems and supports sustainable development. Design innovations also focus on managing lighting and sound; Bruyninckx (2023) traced the historical roots of acoustic masking in open-plan workspaces, noting its role in mediating privacy and interaction. In contrast, personalized approaches such as the system created by Huang et al. (2023) offer alternatives to collective HVAC solutions, emphasizing user mobility and space adaptability. Aksamija & Milosevic (2023) also highlighted the importance of spatial acoustics and lighting for hybrid work settings, balancing team collaboration with individual needs.

In addition, nature-based and biophilic elements emerged as strong contributors to workplace wellbeing. Bressane & de Castro (2025) introduced a fuzzy decision-making framework supporting the integration of green elements such as indoor gardens and green walls, showing improvements in comfort and satisfaction. Similarly, Zamri & Ahmad (2025) associated biophilic design strategies with mental health benefits in coworking spaces, pointing out reduced stress and anxiety levels. The salutogenic design explored by Bergefurt et al. (2024) further demonstrated that simple elements like plants, outdoor views, and colour tones substantially influenced psychological and cognitive responses, offering cost-effective interventions for healthier workspaces. Alizadeh Kateshastabadan et al. (2025) extended this approach by evaluating the acoustic benefits of green walls, highlighting their dual function in reducing noise and supporting mental wellbeing.

Theme 3: Green Resources

Many studies discuss the use of sustainable building materials and resources in the development and interior design of co-working spaces, including the use of recycled and reused materials in acoustics and thermal control, and the use of sustainable lighting; these attributes are grouped under the theme Green Resources.

The selection and application of sustainable building materials and resources have a demonstrable impact on both environmental performance and occupant wellbeing. Kucukali (2025), McCunn & Fell (2025), and Whyte et al. (2024) highlight the importance of incorporating natural and recyclable materials such as wood and acoustic materials, which not only reduce environmental impact but also improve workplace experience. The restorative qualities of wood were shown to enhance affective organizational commitment and wellbeing (McCunn & Fell, 2025), while acoustic materials were found to mitigate noise (Kucukali, 2025). Similarly, Whyte et al. (2024) demonstrate how mass timber construction supports sustainability goals while positively influencing comfort, health, and productivity through measurable reductions in stress levels. Collectively, these studies underline the that the integration of sustainable and natural materials addresses ecological concerns and simultaneously enriches the psychosocial and physiological outcomes for occupants.

Other studies have also explored lighting, shading, and energy systems as critical components of sustainable resource management in co-working spaces. Aliparast & Onaygil (2023, 2024), Sebayang et al. (2024), and Ikuzwe et al. (2020) emphasize the role of human-centred lighting and dynamic shading devices in improving visual comfort, circadian rhythm alignment, and daylight distribution, ultimately advancing energy efficiency. For instance, human-centred lighting systems aligned with WELL standards were found to enhance alertness and cognitive performance (Aliparast & Onaygil, 2024a), while shading devices made from reused egg crates improved daylight uniformity in tropical climates (Sebayang et al., 2024). Retrofitted energy-efficient lighting systems further demonstrated the potential to reduce costs and energy consumption while maintaining comfort (Ikuzwe et al., 2020). Complementing these findings, Wang et al. (2024) and Mantesi et al. (2022) revealed that advanced control systems and adaptive operational strategies in HVAC and post-pandemic office usage can significantly reduce energy consumption, reinforcing the synergy between technological innovation and sustainability in building operations. Meanwhile, Cruz et al. (2021) focused on the sustainability of furniture materials in co-working spaces, linking ergonomic design and ecological choices to user satisfaction and multifunctionality. Collectively, these contributions reveal that sustainable building materials and resource strategies, from wood and acoustic panels to advanced lighting, shading, furniture, and HVAC systems, play a role in achieving both environmental responsibility and human-centred performance in co-working spaces.

Theme 4: Smart Technology

A lot of the studies explore how digital systems, automation, and intelligent design interventions reshape co-working spaces. The studies also highlight how technology integration plays a pivotal role in creating sustainable co-working spaces.

A major stream of research emphasizes the interplay between digitalisation and hybrid models of co-working. Orel et al. (2025) show how the pandemic accelerated a shift from physical to hybrid co-working practices, demonstrating that effective digital environments maintain both wellbeing and productivity while fostering entrepreneurial ecosystems. Flipo et al. (2022) extend this by exploring rural co-working spaces, highlighting how digital infrastructures reduce territorial inequalities, bridge connectivity gaps, and support professional retraining in marginal regions. Similarly, Tintiangko & Soriano (2020) examine co-working in the Global South, particularly in the Philippines, where digital workers derive aspirational belonging from technology-enabled co-working spaces, reflecting the critical role of connectedness in addressing inequalities. Collectively, these studies highlight that digitalisation in co-working spaces is not only about efficiency, but also about sustaining community engagement, bridging social divides, and creating resilient hybrid models.

Smart lighting and shading technologies also emerge as critical components of sustainable co-working environments. Kent et al. (2022) demonstrate that desk-level illuminance sensors, though effective for daylight harvesting, are vulnerable to energy loss when blocked, calling for more robust monitoring systems. They therefore suggest smart lighting systems for open-plan workspaces. Luo et al. (2021) introduce machine-learning based shading controllers that dynamically adjust blinds to balance visual comfort and thermal efficiency in open-plan workspaces. Similarly, Putri et al. (2022) address excess daylight issues in a co-working meeting room, proposing smart lighting solutions using simulation-based design to optimize visual comfort. These findings converge on the importance of integrating intelligent control systems that not only enhance comfort but also significantly reduce energy use in co-working spaces.

Human-centric lighting studies further underscore how smart technologies can directly improve wellbeing and performance. Aliparast & Onaygil (2024b) demonstrate that circadian-based smart lighting with adaptable correlated colour temperatures positively influences satisfaction and cognitive performance, while Hammes et al. (2024) highlight how machine learning can refine occupancy-based lighting systems to reduce artificial switch-off times, minimizing energy waste. Likewise, W. Bian & Hu (2024) employ meta-optimisation to fine-tune occupancy-based dimming systems, striking a balance between energy efficiency and processing time. Together, these studies affirm that adaptive lighting strategies are central to both sustainability and user wellbeing in co-working spaces.

Finally, research on user perceptions of automation reinforces the relationship between humans and technology in co-working spaces. Mathur et al. (2025) reveal that while automation enhances productivity, its acceptance depends heavily on how users perceive its impact on inclusivity, flexibility, and overall atmosphere. These insights align with the broader theme that smart technology must be integrated with a human-centred approach to ensure not only efficiency but also acceptance and satisfaction of its users.

Conceptual Linkage of Themes

Based on the systematic analysis of the identified 55 articles, the relationship between sustainable co-working space attributes and user outcomes transform into a multidimensional and integrated framework where physical, material, and digital elements work together to influence work performance and wellbeing. The four themes (Open Layout, Green Environment, Green Resources, and Smart Technology) form a recurrent system.

The flexibility of open-plan designs is achieved through the selection of sustainable materials, highlighting the relationship between Open Layout and Green Resources. For example, the use of mass timber and recycled materials in acoustic innovations are not only environmentally friendly, but functional to reduce noise in open-plan layouts. Beside that, machine-learning algorithms and automated shading systems result in automated adjustments on thermal and natural light levels based on real-time occupancy – highlighting the important link between Smart Technology and Green Environment. These four themes synthesize to form a sustainable co-working space framework, where (i) Open Layout and Green Resources provide the physical and psychological safety required for human interaction; (ii) Smart Technology optimizes the Green Environment to mitigate the stressors of work, and therefore supporting mental health; and (iii) the combination of all four themes results in a work environment that is not hindered by glare, thermal discomfort, or social isolation, resulting in improved work productivity.

Conclusion

The systematic literature review provides a comprehensive synthesis of the physical attributes that define a sustainable co-working space, emphasizing the shift from traditional office models to holistic and environmentally responsible workspaces. The evidence demonstrates that sustainability in this sector is not limited to environmental conservation but extends to the physical and psychological wellbeing of the users. By integrating spatial flexibility, resource efficiency, and advanced technological systems, co-working spaces can achieve a balance between environmental responsibility and user satisfaction.

The primary objective of this systematic review was to identify the physical attributes that contribute to the sustainability of a co-working space. The scope of this review focused on peer-reviewed journal articles and conference papers published between 2020 and 2025, ensuring the inclusion of post-pandemic perspectives. The review used the PRISMA framework to determine the elements that define a sustainable co-working space and how they impact the users.

The review identified four main themes, namely Open Layout, Green Environment, Green Resources, and Smart Technology. The analysis revealed that open-plan layouts are important for fostering human interaction and work flexibility. Additionally, occupancy management is an important tool to maintain energy efficiency in such layouts. Within the green environment theme, thermal comfort and natural lighting emerged as important factors for user satisfaction. Within the green resources theme, the analysis found that the use of sustainable resources such as mass timber and recycled materials helped reduce environmental footprints while providing restorative benefits to the co-working space users. Finally, the integration of smart technologies such as machine-learning-based lighting and automated HVAC systems were found to be important to optimize energy consumption and personalizing user experience.

This review offers a novel framework that defines the physical attributes of a co-working space. The analysis proves that a sustainable co-working space requires physical attributes that support open layouts, green environments, green resources, and smart technology. Additionally, this review consolidates five years' worth of previous studies and produces a link between the physical attributes of a sustainable co-working space and the impact towards its users. Therefore, this review expands the theoretical understanding of how sustainable infrastructure serves an important role in workers' productivity and wellbeing.

The findings provide significant implications for architects, facility managers, and policymakers. For practitioners, the evidence suggests that incorporating biophilic elements and natural materials is a cost-effective strategy for improving occupant mental health. System designers are encouraged to prioritize smart lighting that aligns with circadian rhythms to enhance cognitive performance. From a policy perspective, the review supports the adoption of standardized sustainability metrics tailored specifically for shared work environments, which can guide future green building certifications and urban development strategies.

While comprehensive, this review has some limitations. The focus on only two databases and the exclusion of non-English publications may have omitted relevant studies from other databases and in other languages. Additionally, the five-year timeframe focuses on modern trends, which may exclude long-term historical data. Future research should prioritize longitudinal studies to evaluate the impacts of sustainable attributes on users. Another suggestion is to study the economic resilience of various sustainability models across different geographic and cultural contexts to find valuable insights into the global scalability of the co-working phenomenon.

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