

## LACK OF RESEARCH ON GREEN RESOURCES IN CO-WORKING SPACES USING ATLAS.TI

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**ABSTRACT:** Co-working spaces are growing all over the world. However, it is unknown how many are designed sustainably. This paper studies green resources - one of the important elements of sustainability - in co-working spaces through an analysis of secondary literature using ATLAS.ti. The meta-data analysis found that there have been minimal studies between 2020-2024 about green resources used in the built environment of co-working spaces. This paper highlights a glaring gap in research and opens up various possibilities for future researchers to study. This paper also proposes industry professionals practice and declare the use of sustainable resources to support and promote the goal towards sustainable co-working spaces for a better tomorrow.

**KEYWORDS:** *Sustainable Co-Working Space; Green Resources; Built Environment*

### 1.0 INTRODUCTION

Experts define a physical workspace as the tangible environment where a person works at; they also define a social workspace as a setting where social interaction occurs, either face-to-face or virtually [1]. Meanwhile, a co-working is defined as a shared work space that are only accessible by members; the space facilitates interactions among members and fosters trust, friendship, mutual feelings of success, individual sociality, and productivity [2]. Independent professionals, entrepreneurs, and micro-enterprises tend to lean towards co-working spaces to do their work in. Co-working spaces have shown to improve human interactions [3], wellbeing [4], and productivity [2]. It also promotes knowledge sharing [5].

Co-working spaces stimulate a circular economy through the sharing of resources among members; this notion is magnified through sustainable elements such as energy-efficient [6] and waste reduction metrics [7]. A co-working space is deemed sustainable when it provides flexible access and shared resources to users, has an open layout, uses renewable energy, promotes sustainable travelling, acts as an incubator, and supports environmental efforts such as recycling and composting [8]. The sustainability of a space can be seen through multiple facets, such as a green environment [4, 9] and the use of green resources [10].

Meta-data analysis is a method used to combine and summarize existing research [11]. Many tools can be used to perform meta-data analyses using qualitative data, such as ATLAS.ti, Dedoose, Delve, and MAXQDA. ATLAS.ti is a suitable tool to be used given that it is used by many researchers around the world [12-14]. ATLAS.ti is a great tool to organize and decipher large amounts of data; it contains many useful functions such as thematic coding, linking central codes, and illustrating networks of code co-occurrences [12].

While co-working spaces typically offer similar features, there has been a lack of research highlighting the green features in existing co-working spaces. Therefore, this paper aims to explore the extent to which existing co-working spaces are sustainably built through the analysis of green resources used in co-working spaces extracted from literature.

This research is in line with the eleventh and twelfth Sustainable Development Goals (SDGs) by the United Nations: “Sustainable Cities and Communities” and “Responsible consumption and production” [15]. This is an exclusive and pioneering study that highlights the lack of research on green resources utilized in existing co-working spaces.

## **2.0 METHODOLOGY**

This paper is directed by the following research question: What are the green resources currently used in co-working spaces? To answer this research question, an analysis was performed through specific and systematic steps.

First, a search was carried out on a bibliometric database (Scopus) using the specific words “co-working space” limited to the last five years (2020-2024). Scopus is a suitable database to be used given that it is subscribed by the Malaysian Ministry of Higher Education, enabling access to higher education institutions in Malaysia. The timeline of the search (2020 until present) aligns with the surge in research on sustainability, specifically on SDGs, as highlighted in the Sustainable Development Report 2020 [16].

This search produced 151 results. The results were narrowed down to only include articles (as opposed to book chapters, editorial papers, etc.); 87 results remain. The results were further restricted to English and non-restrictive articles, where 78 results remain.

The 78 articles were uploaded onto ATLAS.ti and scrutinized for descriptions of green resources used in the built environment of co-working spaces. A preliminary step was conducted using ATLAS.ti's ‘Intentional AI Coding’ feature, followed by an article-by-article refinement by the author. The refinement found that the Intentional AI Coding feature was still a work-in-progress and could not generate neither accurate nor relevant results. Ensuing this, a manual scrutinization was conducted using ATLAS.ti on the 78 articles. To do this, the ‘Search & Code’ function was utilized using the ‘Text Search’ function. All documents were selected, and the option ‘Sentence’ was selected to search for keywords describing or representing green resources, namely ‘biodegradable’ OR ‘carbon footprint’ OR ‘carbon offset’ OR ‘conservation’ OR ‘eco-conscious’ OR ‘eco-friendly’ OR ‘energy efficient’ OR ‘environmental impact’ OR ‘green’ OR ‘natural resource’ OR ‘net-zero’ OR ‘organic’ OR ‘post-consumer’ OR ‘preservation’ OR ‘reclaimed’ OR ‘recycle’ OR ‘reduce’ OR ‘renewable’ OR ‘energy’ OR ‘sustainable’ OR ‘zero-waste’ OR ‘material’ OR ‘bamboo’ OR ‘cork’ OR ‘recycled plastic’ OR ‘reclaimed wood’ OR ‘rammed earth’ OR ‘ferrock’ OR ‘green thermal insulation’ OR ‘ashcrete’ OR ‘straw bales’ OR ‘sheep wool’ OR ‘mud brick’ OR ‘cross laminated timber’ OR ‘adobe’ OR ‘recycled steel’ OR ‘hempcrete’ OR ‘mycelium’ OR ‘foam concrete’ OR ‘lumber’ OR ‘structural insulated panel’ OR ‘cob’ including inflected forms of the words (i.e. to include continuous tense, past tense, and plural forms) to ensure a comprehensive search. The keywords were identified from a comprehensive review of 36 articles [17-52]. Following this, a refinement was performed on the search results, where the relevant sentences were saved as quotations and codes were applied. The final results were tabulated and analyzed, followed by a conclusion.

The flow of methodology can be seen in Figure 1.

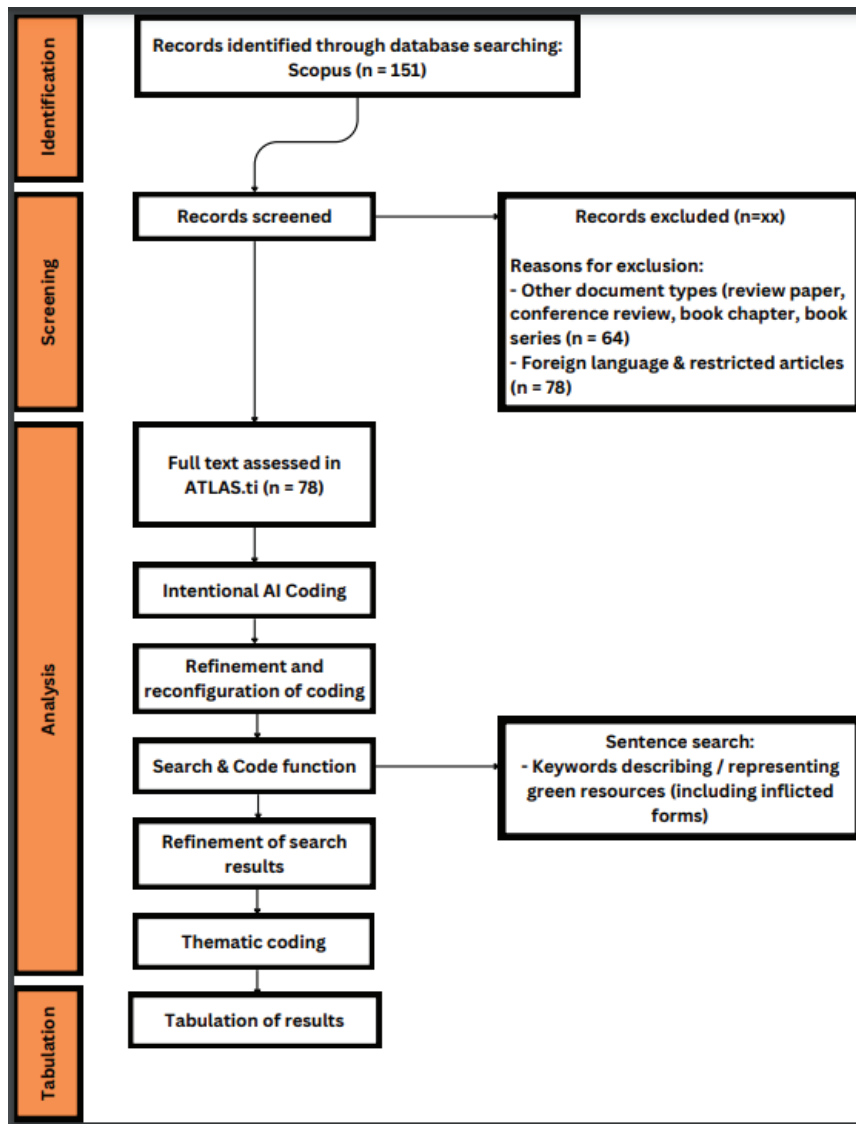


Figure 1. Flow of methodology

### 3.0 RESULTS AND DISCUSSION

Two pivotal insights emerged from the analysis. First, not a single article on the Scopus database published between the years 2020-2024 described the implementation of green resources in co-working spaces. This was a startling discovery, given the weight put on sustainability over the past few years. Second, there were only five articles that mentioned (the potential of) using green resources in co-working spaces. Two studies [53, 54] suggested using sustainably built movable buildings as co-working spaces. Interestingly, the movable building framework was already tested in a small-scale experiment in a larger building. While it has not been tested specifically as a co-working space, the research shows great potential to be adapted into co-working spaces. Another study [55] suggests providing sustainable furniture as a service towards co-working spaces as a way to promote the furniture manufacturer. This also shows promising potential towards a more sustainable built environment of co-working spaces. One study [56] suggested the use of clean energy buildings as co-working spaces, and lastly, one study [57] suggested the use of renewable materials in acoustic panels of co-working spaces. These findings are summarized in Table 1.

Table 1. Studies highlighting potential use of green resources in co-working spaces

Author(s)	Description	Green materials proposed / used
[53, 54]	Potential use of eco-friendly pre-fabricated movable buildings as co-working spaces	Renewable energy sources (photovoltaic panels, electric storages, wind turbines), eco-friendly building materials (porcelain, fir timber), energy-efficient fittings (smart windows)
[55]	Framework to provide sustainable furniture as a service (FaaS) to co-working spaces	Recycled products sourced from local waste materials (cork, leather, sandblasting residue, flooring residue)
[56]	Framework to use clean energy buildings as co-working spaces	Production and distribution of green hydrogen
[57]	Potential use of sustainable acoustic panels in co-working spaces	Post-industrial textile waste (flax, hemp, kenaf, jute, agave, bamboo, coconut, wool)

#### 4.0 CONCLUSION

After rigorous screening, not a single article met the inclusion criteria for this review. However, while not specifically describing presently available co-working spaces, five articles described the idea and potential for green resources to be used in co-working spaces: one article suggested the use of energy-efficient buildings as co-working spaces, one article suggested the use of recycled furniture in co-working spaces, two articles suggested the use of eco-friendly pre-fabricated buildings as co-working spaces, and one article suggested the use of renewable materials in acoustic panels of co-working spaces. Given the lack of research, the answer to the research question “What are the green resources currently used in co-working spaces?” therefore remains unanswered, opening up a wide range of potential studies for future researchers. One suggestion, a glaring one at that, is to conduct a primary study to ascertain the sustainable or green resources used in constructing co-working spaces in the locality of each researcher. The findings would pave the way for further studies to compare each localities’ level of sustainability of co-working spaces, and, collectively, promote the use of green resources, making headway towards responsible consumption and production and supporting sustainable cities and communities.

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