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Sustainability Integration for Efficiency and Well-Being in Optimising Architectural Workspaces: Malaysian Architects' Perspectives

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ABSTRACT

This qualitative study explores the perspectives of eight Malaysian architects on integrating sustainable design elements in architectural workspaces to enhance efficiency and well-being. Sustainability has become a critical focus in contemporary architectural practices, emphasising a balance between environmental, social, and economic factors. However, there remains a gap in understanding how sustainable design principles can be effectively applied within workspaces to simultaneously optimise functionality and improve occupant well-being. Using semi-structured interviews, the research examines the architects' perceptions, challenges, and strategies related to sustainability in optimising architectural workspaces. The findings highlight varied viewpoints on sustainability's significance, encompassing environmental stewardship, occupant comfort, and productivity, but face practical limitations such as cost and regulatory barriers. The study proposed a Sustainable Workspace Integration Model, linking the United Nations Sustainable Development Goals with workspace elements and organisational practices to achieve sustainable outcomes. The contribution lies in offering both theoretical advancement and practical guidelines for architecture firms, policymakers and educators.

Keywords: Architectural Workspaces; Architecture Consultancy Practice; Sustainable Development Goals; Sustainable Workspace; Well-Being

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INTRODUCTION

The workspace has evolved over the past centuries, the well-being of an individual in different working environments has been greatly discussed and debated. The pandemic has further transformed our ways of working and communicating. Henn (2022) stated, "We need new ways to navigate the relationship between the private workspace and the public sphere," emphasising the necessity to design workspaces that embrace flexibility and adaptability. While

some individuals have embraced remote working, others emphasise the value of face-to-face communication in fostering productivity and collaboration. Challenges associated with remote work, such as inadequate furniture and equipment, distractions from technology, and communication barriers, have been identified as significant impediments (McGee et al., 2023). Recent research by Mokhtar (2023) highlights a looming challenge in major Asia Pacific (APAC) cities - a critical undersupply of sustainable buildings as occupiers increasingly prioritises environmentally friendly spaces. It is widely acknowledged that a sustainable workspace contributes to environmental, social, and economic responsibility (Miroslavov, 2023). Therefore, the study of workspaces should not only focus on the well-being of occupants but also consider the quality and sustainability of the workspace.

Within architecture offices, workspaces transcend mere functionality, serving as social hubs that facilitate interpersonal connections and collaborative innovation. Existing research highlights that collaborative workspace, access to appropriate equipment, and effective communication are more successfully achieved in an office setting than in remote environments (McGee et al., 2023). Furthermore, the growing availability of product information online necessitates that architecture firms adopt discerning approaches to managing physical samples and catalogues while balancing digital storage solutions and addressing diverse team needs (Liao, 2016). However, limited research exists on these aspects within the specific context of architectural workspaces, particularly in Malaysia. While global studies provide various perspectives into general workspace guidelines, few investigate how architects themselves could perceive and implement sustainability within their own firms. This constitutes a critical research gap – as architect who both design and inhabit workspaces, remain under-documented.

To address these issues, the study draws on three theoretical perspectives that aligns with the United Nations Sustainable Development Goals. Firstly, environment psychology which align with SDG 3: Good Health and Well-being that emphasizes on comfort, satisfaction and belonging of workers (Vischer, 2008). Second, organisational behaviour integrating with SDG 11: Sustainable Cities and Communities to discuss on community engagement and collaborative culture in workspace. Third, having SDG 17: Partnerships for the Goals as the backdrop, laying out workspace typologies to foster sustainability within architectural workspaces.

This paper aims to explore the integration of sustainability principles to enhance efficiency and well-being in optimising architectural workspaces, with a particular focus on the perspectives of Malaysian architects. It seeks to identify the elements of sustainable workspace, the limitations for implementation, and the strategies to employ both efficiency and well-being in architectural workspaces.

LITERATURE REVIEW

The Elements of Sustainable Workspace

The elements of a sustainable workspace for architecture firms are summarised in Table 1, with the research objectives being referenced by a total of 20 scholars. Based on a review of these articles, the elements of sustainable workspaces are categorised into three key groups aligned with the United Nations Sustainable Development Goals (SDGs): SDG 3: Good Health and Well-being, SDG 11: Sustainable Cities and Communities, and SDG 17: Partnerships for the Goals, as outlined in Table 1. Each group is further divided into specific sub-elements, with their respective citation frequencies detailed in Table 2.5.

The first primary element, SDG 3: Good Health and Well-being, comprises four sub-elements. Among these, the most frequently cited are work environment and psychological factors, each referenced by 11 scholars. This highlights the importance of creating workspaces that support both physical and mental well-being. The second key element, SDG 11: Sustainable Cities and Communities, encompasses three sub-elements. Of these, community engagement is the most frequently mentioned, with a total of 13 citations. This underscores the role of architecture firms in fostering sustainable community development through their workspace practices.

Finally, SDG 17: Partnerships for the Goals constitutes the third main element. It consists of three sub-elements, with knowledge sharing receiving the highest frequency of citations, referenced by six scholars. This reflects the importance of collaboration and knowledge exchange in promoting sustainable practices within architectural workspaces. This categorisation provides a structured framework for understanding and implementing sustainable workspace practices in architecture firms. Among these, the top 5 sub-elements that obtained the most consensus among previous scholars are as follows:

i. Community Engagement (13 scholars)
ii. Work Environment (11 scholars)
iii. Psychological Factors (11 scholars)
iv. Management (8 scholars)
v. Environmental Considerations (8 scholars)

Table 1
The elements of sustainable workspace for architecture firms

Authors \ Elements	SDG 3: Good Health and Well-Being				SDG 11: Sustainable Cities and Communities			SDG 17: Partnership for the Goals		
	Work Environment	Location	Management	Psychological Factors	Environmental Impact	Workplace Design	Community Engagement	Knowledge Sharing	Material Sharing	Space Sharing
Hanie et al., 2010	/	/	/	/		/				
Thach et al., 2019	/									
Mossim et al., 2018	/	/	/		/		/	/		
Corporate Wellness Magazine., n.d.	/	/	/	/			/			
Farahat & Alaeddine, 2020	/	/		/	/	/	/			
Contreras et al., 2022			/	/			/			
Chafi et al., 2022			/	/	/					
Nagy & Lindsay, 2018	/	/	/				/	/	/	/
Electric. 2023					/					
Bodin Danielsson & Theorell, 2024	/				/	/				
Awang & Denan, 2012	/			/		/	/			
Lin et al., 2022	/	/			/					
Jean-Baptiste, 2020				/		/	/			
Fauth & Pieper, 2022	/		/	/	/	/	/		/	
Md Ajis & Naka, 2014						/		/		
Alavi et al., 2018				/		/	/			/
Setiawan, 2022	/				/		/	/		
Zhao et al., 2020				/			/	/	/	/
Finsa, 2022							/	/	/	
Cinar & Bilodeau, 2022			/	/			/			
Times referred	11	6	8	11	8	8	13	6	4	3

SDG 3: Good Health and Well-Being

The first sub-element of a sustainable workspace under the 'SDG 3: Good Health and Well-being' category is the work environment, which was cited by 11 scholars. As outlined by SDG 3, ensuring healthy lives and promoting well-being for all at all ages is critical, particularly given that most individuals spend a significant portion of their lives working. Hanie (2010) referenced a World Health Organization (WHO) report indicating that up to 30% of newly constructed or renovated buildings worldwide experience substantial complaints regarding indoor air quality (IAQ). Poor IAQ can lead to Sick Building Syndrome (SBS), a condition where building occupants report acute health and

comfort effects linked to time spent in the building without any identifiable illness or cause (Boxer, 1990; Hanie et al., 2010). Symptoms of SBS commonly include fatigue and drowsiness (Thach et al., 2019).

To mitigate these challenges, Hanie (2010) proposed six solutions to improve indoor environmental quality, including the application of local exhaust ventilation in high-risk areas such as toilets and printing rooms to remove pollutants. Additionally, modifying or eliminating pollutant sources was strongly recommended. The Architecture Guide to the UN 17 Sustainable Development Goals further emphasises designs that foster a healthy indoor environment by addressing key factors such as lighting, acoustics, air quality, and exposure to radiation.

The second sub-element, psychological factors, was also highlighted by 11 scholars as a significant contributor to sustainable workspaces. These factors encompass stress reduction and workspace flexibility. Hanie et al. (2010) stressed that flexible workspace designs, which allow employees personal control over their environment, play a crucial role in mitigating SBS. This includes flexible furniture arrangements and workspace designs that maximise comfort and adaptability. Flexible work modes, such as remote or hybrid arrangements, were also found to enhance mental health by increasing autonomy and adaptability (Chafi et al., 2022). Additional initiatives, including wellness programmes, meditation spaces, and scheduled breaks, have been recommended to alleviate stress and improve mental well-being (Corporate Wellness Magazine, n.d.). The integration of biophilic design, which incorporates natural elements into workspace environments, has been identified as an effective approach to reduce stress and provide therapeutic benefits for both mental and physical health (Suharjanto, 2017; Nagy & Lindsay, 2018).

The third sub-element is management, which was cited by eight scholars. Effective management practices, including education and awareness initiatives for both employees and leadership, were identified as critical for achieving a sustainable workspace. Psychological factors influencing employee performance, such as the physical work environment, availability of equipment, meaningfulness of tasks, performance expectations, and constructive feedback, were emphasised (Bushiri, 2014; Farahat & Alaeddine, 2020). Individual mindfulness practices were highlighted for their potential to foster positive emotions, enhance learning, and improve problem-solving abilities (Contreras et al., 2022). Corporate Social Responsibility (CSR) initiatives that align with sustainability objectives were also noted as mechanisms for fostering employee pride and engagement (Paillé et al., 2018; Harlin and Berglund, 2021; Barin Cruz et al., 2016; Ciocirlan, 2017). Furthermore, cultivating an organisational culture that rewards collaboration and promotes inclusivity and environmental consciousness was strongly recommended.

The final sub-element is the location of the workspace, which was cited by six scholars. The Architecture Guide to the UN 17 Sustainable Development Goals emphasised the importance of integrating public urban spaces that accommodate various functions, including infrastructure, parking, and street furniture. Proximity to public infrastructure has been positively associated with higher levels of employee satisfaction (Farahat & Alaeddine, 2020). Active transportation, such as walking or cycling to work, was identified as beneficial for cardiovascular health and stress reduction (Corporate Wellness Magazine, n.d.). To enhance employee well-being and reduce environmental impact, sustainable transportation programmes were recommended. Additionally, ensuring optimal workspace locations with high external air quality was noted as a priority for promoting both employee wellness and environmental sustainability (Hanie et al., 2010).

By addressing these four sub-elements, work environment, psychological factors, management, and location - the principles of SDG 3: Good Health and Well-being can be effectively integrated into sustainable workspaces for architecture firms.

SDG 11: Sustainable Cities and Communities

The first sub-element of SDG 11: Sustainable Cities and Communities is community engagement, which was highlighted by 13 scholars as a critical factor for fostering sustainable workspaces. The construction industry, being one of the largest consumers of resources and raw materials, accounts for 50% of global steel production and an annual consumption of 3 billion tonnes of raw materials (Fauth & Pieper, 2022). In this context, establishing collaborative communities within sustainable workspaces is imperative. One approach is the adoption of Activity-Based Offices (ABO), a workspace model where spaces are allocated based on specific activities rather than being assigned to individual employees (Fauth & Pieper, 2022). Another emerging model is coworking spaces, defined by Cho (2020) as shared facilities that encourage social interaction and foster a sense of community (Nagy & Lindsay, 2018). Coworking spaces offer several benefits, including work flexibility, serendipitous interactions, idea generation, business networking, and a solution to the isolation often associated with remote work (King, 2017; Garrett et al., 2017; Zhao et al., 2020). Spatial integration also plays a crucial role, with Hillier and Penn emphasising its correlation with the perceived utility of individuals within a workspace (Alavi et al., 2018). According to Corporate Wellness Magazine, collaborative efforts to achieve sustainability goals within a workspace enhance trust, communication, and shared purpose, ultimately improving overall productivity.

The second sub-element is the environmental impact of sustainable workspaces, which was identified by eight scholars. The overarching aim of SDG 11 is to create inclusive, resilient, safe, and sustainable human settlements and cities. Schneider Electric

proposed three key principles for sustainability in building design, which are equally applicable to sustainable workspaces: (1) promoting energy efficiency through renewable energy sources, natural light, and ventilation; (2) leveraging rainwater harvesting in water-scarce regions for collection and purification; and (3) adopting Life Cycle Assessments (LCA) to evaluate environmental impact and carbon footprints (Schneider Electric, 2023; Quist, 2023). Furthermore, AN ARCHITECTURE GUIDE to the UN 17 Sustainable Development Goals advocates for implementing wayfinding systems that cater to individuals with visual or cognitive impairments (Mossim et al., 2018). These systems incorporate tactile and auditory elements to ensure inclusive navigation within workspaces.

The third sub-element, workplace design, was also cited by eight scholars as an integral factor under the SDG 11: Sustainable Cities and Communities framework. Effective workplace design addresses occupants' perceptions and promotes inclusivity. The shift from a "monozukuri-based" economy to a knowledge-based economy has necessitated creative and innovative business practices, which are especially relevant for architecture firms (Md Ajis & Naka, 2014). However, research specific to the Malaysian context remains limited. Architecture offices not only serve functional purposes but also foster creativity, posing significant challenges for both employees and the work environment (Awang et al., 2012). Alavi et al. (2018) proposed a five-step framework for enhancing spatial layouts in workplaces, which includes (1) identifying user concerns through early studies; (2) evaluating spatial attributes that address those concerns; (3) mapping designed workspaces along key spatial parameters; (4) identifying zones of optimal spatial quality; and (5) iterating the design based on findings. In addition to spatial considerations, inclusive design plays a pivotal role in creating sustainable workspaces. Joe Gerstandt's observation underscores the importance of proactive inclusion: "If you do not intentionally, deliberately, and proactively include, you will unintentionally exclude" (Jean-Baptiste, 2020).

Statutory frameworks such as the Uniform Building By-Laws (Amendment) 1991 (UBBL) 34A emphasise accessibility for individuals with disabilities, ensuring their ability to navigate buildings effectively. Moreover, AN ARCHITECTURE GUIDE to the UN 17 Sustainable Development Goals reiterates the importance of wayfinding systems that cater to multiple senses, addressing the needs of individuals with visual or cognitive impairments (Mossim et al., 2018). These three sub-elements, community engagement, environmental impact, and workplace design underscore the importance of a holistic approach to achieving sustainable workspaces under the principles of SDG 11: Sustainable Cities and Communities.

SDG 17: Partnerships for the Goals

The first sub-element under the group of SDG 17: Partnerships for the Goals is knowledge sharing, cited by six scholars as a vital element for achieving sustainable workspaces. Data from the Board of Architects Malaysia (LAM) reveals that Malaysia has a total of 1,816 registered architectural consultancy practices, of which 1,351 operate as sole proprietorships. This organisational structure underscores the importance of knowledge sharing within architectural firms, enabling them to generate ideas and proposals that contribute to the development of sustainable cities and communities. Architects, as facilitators, can promote open dialogues and partnerships to advocate for regulations that drive sustainability, as emphasised by Mogens Lykketoft, former Danish Minister of Finance and Foreign Affairs (Setiawan, 2022). A recommended target for achieving SDG 17 involves collaboration among architectural firms, educational institutions, research organisations, and industry associations to facilitate knowledge sharing and capacity building (Mossim et al., 2018). However, Malaysia currently lacks dedicated platforms or workspaces to foster such partnerships. This gap highlights the need for collaborative environments. Guan Yi, founder of Beyondto Collective Studio in Kuala Lumpur, Malaysia, proposed coworking spaces tailored to the architecture and design sectors, aiming to provide industry exposure and opportunities for small firms to benefit from cross-disciplinary interactions (Choo, 2023). Guan Yi emphasised the importance of creating not just physical workspaces but also a community that supports architecture firms in achieving broader industry engagement and sustainable practices.

The second sub-element is material sharing, identified by four scholars (Nagy & Lindsay, 2018; Fauth & Pieper, 2022; Zhao et al., 2020; Finsa, 2022) as critical to building sustainable workspaces. Construction is responsible for approximately 40% of the world's carbon dioxide emissions and generates about one-third of global waste (Miller, 2021). Advances in construction materials research, such as biological materials and innovative plastics (Finsa, 2022), underscore the importance of material sharing to promote sustainability in sourcing building materials. For example, Workspace by Boonthavorn, a three-story coworking space in Thailand, offers a material library and coworking facilities free of charge. This initiative supports young practitioners and designers in developing projects while fostering partnerships with local suppliers (Architecture, 2017). Such collaborative models illustrate how material sharing can drive sustainable practices within architectural workspaces.

The third sub-element is space sharing, referenced by three scholars (Nagy & Lindsay, 2018; Alavi et al., 2018; Zhao et al., 2020) as an emerging trend for sustainable workspaces. The adoption of coworking spaces, defined as "shared workspaces utilised by knowledge professionals, such as freelancers, in various specialisations within the

knowledge industry" (Gandini, 2015), has grown significantly. Coworking spaces provide several benefits, including work flexibility, serendipitous encounters, idea generation, business networking, and alleviation of isolation associated with remote work (Zhao et al., 2020). Zhao's (2020) study highlights that the sense of community within coworking spaces is fostered through endorsing, encountering, and engaging interactions among members. Initially designed as hubs for social interaction, collaboration, entrepreneurship, and innovation, coworking spaces also offer cost-effective facilities and services. These spaces enable startups to reach markets quickly without being burdened by office management and overhead costs (Bouncken, 2021; Nagy & Lindsay, 2018).

Together, knowledge sharing, material sharing, and space sharing represent integral components of SDG 17: Partnerships for the Goals, emphasising the need for collaborative, resource-efficient, and inclusive strategies to achieve sustainable workspaces. These elements not only support the environmental and social goals of architectural firms but also promote industry-wide innovation and resilience.

METHODOLOGY

This research employs a qualitative approach to achieve its objectives through in-depth interviews. To ensure the quality and relevance of the data, experienced architects in Malaysia were purposively selected using judgemental sampling techniques. The participants were chosen based on their expertise and familiarity with the current state of sustainable development concepts and architectural workspace design. The inclusion criteria required participants to:

i. Hold at least a Bachelor's degree in architecture or equivalent professional qualification.
ii. Have a minimum of two years professional experience.
iii. Be currently employed in a Malaysia architectural consultancy practice.
iv. Possess familiarity with sustainability principles in design.

A total of eight architects agreed to participate in the interview sessions. They representing a range of positions from assistant architect to director. The participants group is weighted towards small and medium-sized architecture consultancy practices, located in Klang Valley, with diversity of practice types but also limits diversity in firm size and location. This limitation is acknowledged in the findings.

Data collection was conducted through structured online interviews designed to elicit comprehensive insights into sustainable workspaces in architectural firms in Malaysia. Participants were asked a series of targeted questions regarding their experiences and perspectives on sustainable development, particularly in relation to the evolution of workspace design.

The collected data were analysed using content analysis and narrative analysis methods. Content analysis involved systematically coding and categorising the responses to identify recurring themes and patterns. This method provided a structured framework for synthesising the participants' perspectives. Narrative analysis, on the other hand, focused on understanding the contextual and underlying stories within the responses. The analytical process included comparing participants' answers to each interview question, enabling the researchers to evaluate how well the research objectives were addressed. This comparative approach also facilitated data triangulation, enhancing the reliability and validity of the findings. By examining the responses in detail, the study identified key elements contributing to sustainable workspaces.

Several measures were implemented to ensure the credibility and reliability of the findings. First, the use of judgemental sampling ensured that only knowledgeable and experienced professionals were selected, thereby enhancing the quality of the data. Second, conducting interviews online addressed logistical challenges posed by the COVID-19 pandemic and enabled broader geographic representation. Third, the integration of content and narrative analysis provided a robust and systematic framework for interpreting the qualitative data.

This qualitative study, through in-depth interviews with experienced architects, offers valuable insights into sustainable workspace for architecture consultancy practices in Malaysia. The use of rigorous analytical methods ensures a robust understanding of the identified elements of sustainable workspaces. The findings contribute to the broader discourse on sustainable workspace practices, particularly in the context of architectural workspaces.

Question Design

The question design for the interview session consists of 2 sections, namely:

Section A – Respondent background and demographics.

Section B – Understanding on the element of sustainable workspace

RESULTS

Table 2
Respondents' Background

Respondent	**Background**	
Respondent 1	Gender	Male
	Position held	Director
	Size of practice	Medium-sized
	Type of practice	Body corporate
	Location of practice	Selangor
	Years of working experience	9 years
	Level of highest education	Bachelor's degree

Respondent	Background	
Respondent 2	Gender	Male
	Position held	Partner
	Size of practice	Small-sized
	Type of practice	Partnership
	Location of practice	Selangor
	Years of working experience	4 years
	Level of highest education	Bachelor's degree
Respondent 3	Gender	Female
	Position held	Director
	Size of practice	Small-sized
	Type of practice	Sole proprietorship
	Location of practice	Kuala Lumpur
	Years of working experience	10 years
	Level of highest education	Postgraduate diploma
Respondent 4	Gender	Female
	Position held	Partner
	Size of practice	Small-sized
	Type of practice	Partnership
	Location of practice	Selangor
	Years of working experience	4 years
	Level of highest education	Bachelor's degree
Respondent 5	Gender	Female
	Position held	Director
	Size of practice	Small-sized
	Type of practice	Body corporate
	Location of practice	Selangor
	Years of working experience	10 years
	Level of highest education	Bachelor's degree
Respondent 6	Gender	Female
	Position held	Partner
	Size of practice	Small-sized
	Type of practice	Partnership
	Location of practice	Kuala Lumpur
	Years of working experience	11 years
	Level of highest education	Master's degree
Respondent 7	Gender	Female
	Position held	Assistant Architect
	Size of practice	Small-sized
	Type of practice	Body corporate
	Location of practice	Selangor
	Years of working experience	4 years
	Level of highest education	Bachelor's degree
Respondent 8	Gender	Female
	Position held	Assistant Architect
	Size of practice	Medium-sized
	Type of practice	Body corporate
	Location of practice	Selangor
	Years of working experience	2 Years
	Level of highest education	Bachelor's degree

Finding on Elements of Sustainable Workspace

Question 1:

The elements of Sustainable Development Goals is related to the workspace are SDG 3: Good Health and Well-being, SDG 11: Sustainable Cities and Communities and SDG 17: Partnership for the Goals. Do you agree, and why?

Finding:

Sustainable Development Goals (SDGs) 3, 11, and 17 can play significant roles, albeit in different capacities, in the context of architectural workspaces.

SDG 3 focuses on ensuring healthy lives and promoting well-being for all at all ages, which is fundamental to human survival. Within the workspace, this goal translates to prioritising employee health, safety, and wellness. Architectural firms can contribute by designing workspaces that promote physical and mental health, providing access to health resources, and ensuring safe working conditions. This foundational aspect is crucial as it directly impacts the productivity and morale of employees.

Although SDG 11 primarily targets broader urban and community-level sustainability, its principles can be applied within architectural firms through sustainable work practices. This includes implementing green building practices, promoting community engagement, and encouraging environmentally responsible operations. While SDG 11 might seem beyond the direct control of an individual workspace, architectural firms can still contribute by advocating for and adopting sustainable designs and practices within their projects and operations.

SDG 17 emphasises the importance of collaborative efforts, networking, and knowledge sharing to achieve sustainability goals. Within architectural workspaces, this goal is relevant at the level of directors and partners. It underscores the necessity for leadership to align on shared objectives and goals to drive the company forward. By fostering partnerships and collaborations both within the industry and with external stakeholders, architectural firms can leverage collective expertise and resources to enhance their sustainability initiatives.

While SDGs 11 and 17 may seem beyond the direct influence of a single architectural workspace, they still serve as crucial blueprints guiding all stakeholders, including workspaces, towards achieving the UN's sustainability goals. SDG 3 is directly applicable within the workspace, focusing on employee health, safety, and wellness. SDG 11 and SDG 17, though broader, encourage sustainable practices, community engagement, and collaborative efforts, which are essential for fostering a holistic approach to sustainability in the architectural industry.

By integrating the principles of these SDGs, architectural firms can enhance their contributions to sustainability, promoting healthier work environments, fostering sustainable practices, and driving collaborative efforts to achieve broader sustainability goals.

Question 2:

What's your overview on the following elements related to sustainable workspace at architecture firms? a) community engagement b) work environment c) psychological factors d) management e) environmental consideration.

Finding:

a) Community Engagement

Integrating Sustainable Development Goals (SDGs) within architectural workspaces can yield significant benefits. However, the impact and applicability of each goal can vary.

SDG 3 is crucial within the workspace as it focuses on ensuring the health, safety, and well-being of employees. This goal directly impacts productivity and morale, making it fundamental for the survival and success of the firm. Architectural firms can contribute by designing healthy work environments, providing access to wellness resources, and ensuring safe working conditions.

Although SDG 11 primarily addresses urban sustainability, its principles can influence architectural practices. Engaging with the community allows architectural firms to understand local needs, enabling the creation of niche projects that foster a symbiotic relationship. This approach ensures that firms can develop sustainable practices that benefit both the community and the business.

SDG 17 emphasises the importance of collaboration, networking, and knowledge sharing. Within the workspace, this goal focuses on engagement with colleagues, seniors, and management. Effective communication is key to maintaining sustainable working relationships at all levels. A breakdown in communication can lead to staff turnover, causing disruptions and additional costs for retraining. Therefore, fostering a collaborative and communicative environment is essential for organisational stability.

While SDGs 11 and 17 may seem beyond the direct control of a single architectural workspace, they still guide firms towards achieving broader sustainability goals. SDG 3 is directly applicable, focusing on employee health and well-being. SDG 11, while more community-orientated, encourages sustainable practices within projects. SDG 17 underscores the importance of internal communication and collaboration.

Architectural firms can enhance sustainability by integrating these SDGs, promoting healthier work environments, sustainable practices, and collaborative efforts. Effective engagement with colleagues and management improves networking and social skills, ensuring a sustainable and efficient workspace. Engaging with the community, despite its challenges, creates a better understanding of local needs, fostering sustainable practices that benefit both the community and the firm.

b) Work Environment

Ensuring a sustainable and healthy workspace is crucial for the overall efficiency and well-being of an architectural firm. Here are some key points refined and merged:

Maintaining both physical and mental health in the workspace is essential. A healthy and ready team is fundamental for achieving high productivity and efficiency. A positive and well-bonded office culture is vital. It fosters a sense of community and support among colleagues, leading to higher job satisfaction and retention rates. Practicing sustainability in the workspace not only benefits the environment but also optimises resource usage and reduces costs.

Engaging with the community allows architectural firms to better understand local needs, fostering a sustainable practice that benefits both the firm and the community. This relationship can be symbiotic, ensuring long-term sustainability for the firm. A healthy and positive work environment, promoting sustainability measures, and engaging with the community are all essential for reducing costs, improving productivity, and ensuring the overall well-being of an architectural firm.

c) Psychological Factors

In today's fast-paced work culture, finding a balance between work and personal life has become increasingly challenging, often leading to stress and burnout. To alleviate this burden, it's crucial for companies to implement effective workload monitoring and encourage delegation rather than relying solely on individual efforts. Embracing a team-orientated approach fosters collaboration and shared responsibility, easing the overall workload and promoting a sense of support among team members.

Psychological factors play a significant role in an individual's ability to thrive in the workspace. Factors such as adaptability to the office culture, mental resilience, and stress management skills are crucial for long-term sustainability in any industry. While many offices offer support and training programmes to help employees navigate the demands of their roles, there remains a noticeable gap between architectural education and professional practice, leading to mismatches in expectations and adaptability issues. Addressing this disconnect is vital to mitigate disruptions and ensure a cohesive work environment.

Architectural firms can proactively address these challenges by integrating sustainability measures that prioritise the psychological well-being of their employees. By reducing unnecessary mental burdens and fostering a supportive work culture, firms can mitigate burnout and staff turnover, ultimately enhancing productivity and project outcomes.

Stress and burnout not only affect individual well-being but also have tangible effects on productivity and project outcomes. High stress levels can lead to errors and delays, resulting in additional time and resources needed for correction. Moreover, demotivated staff are less likely to be productive, potentially prolonging project timelines and increasing costs.

To create an optimal work environment, it's essential that all aspects of the workspace, from workload distribution to physical infrastructure, are well-equipped and maintained. This ensures that employees have the necessary tools and support to perform their tasks efficiently and effectively.

d) Management

Top management plays a critical role in ensuring the smooth operation of an architectural firm. Each member of the management team should have a clear understanding of their roles and responsibilities, fostering cohesion and clarity within the organisation. Establishing an office practice handbook ensures that all colleagues, from staff to directors, are aligned with the company's goals and expectations, promoting a unified mindset across the board.

Furthermore, succession planning should be transparent and accessible to all staff members, providing a sense of stability and direction for the future of the firm. Embracing digitalisation and workflow improvements enhances efficiency and standardisation, enabling smoother operations and reducing unnecessary costs and time wastage. Regular training programmes keep staff abreast of industry best practices, ensuring that they remain competitive and skilled in their roles.

In addition to professional development, prioritising employee well-being is paramount. Offering comprehensive medical and financial support, including insurance coverage and personal assistance, boosts morale and reduces disruptions caused by personal stressors. By incorporating sustainability measures into management practices, firms can minimise waste and optimise resource allocation, further enhancing productivity and operational efficiency.

Effective risk management is crucial to pre-empting potential problems and minimising unexpected expenses. Proactive identification and mitigation of risks help mitigate disruptions and keep projects on track. Coordination among teams and departments is essential for streamlining workflows and avoiding inefficiencies that can lead to increased costs.

Promoting a healthy work-life balance is essential for employee satisfaction and retention. While overtime work may sometimes be unavoidable, offering compensation or allowances demonstrates appreciation for employees' contributions and helps maintain morale within the workforce. Effective employee involvement and performance monitoring are essential for maintaining productivity and achieving organisational goals. Management should adopt flexible approaches that accommodate the diverse characteristics and needs of employees, fostering a supportive and inclusive work culture.

e) Environmental Consideration

Incorporating outdoor activities into office culture, such as site visits, project tours, and sports, can significantly enhance productivity and contribute to improved mental health among employees. Exposure to outdoor environments not only offers a refreshing change of scenery but also fosters a sense of well-being and creativity.

Creating a workspace that prioritises safety and comfort is essential for maintaining employee health and satisfaction. Features like natural ventilation, ample natural light, and breakout spaces with greenery contribute to a conducive work environment, reducing the risk of sick building syndrome and promoting overall well-being.

Sustainability measures extend beyond environmental considerations to encompass various aspects of business operations. Architectural firms can contribute to sustainability efforts by recycling waste materials, minimising the use of perishables, and implementing cloud-based systems to reduce physical storage needs. These initiatives not only benefit the environment but also optimise resource usage and promote efficiency within the company.

However, unforeseen site conditions and weather-related delays can pose challenges and increase costs during project execution. Proactive risk management strategies, such as thorough site assessments and contingency planning, help mitigate these risks and minimise potential disruptions.

CONCLUSION

This research critically investigates the integration of sustainability principles in optimising architectural workspaces, with specific reference to the Malaysian architectural context. The study advances the discourse on sustainable practice by situating architectural workspaces as sites where environmental performance, occupational well-being, and organisational resilience intersect. Qualitative evidence drawn from Malaysian architects underscores three key dimensions.

First, indoor environmental quality, ergonomic design, and strategies for stress mitigation are identified as foundational to embedding sustainability within architectural

workspaces. These findings extend the sustainability agenda beyond resource efficiency, foregrounding the nexus between environmental performance and human well-being. Second, the study highlights the need to reconceptualise architectural workspaces as outwardly oriented, inclusive spaces that engage with community needs and environmental imperatives. This perspective reframes the architectural workplace as an actor in broader socio-ecological systems rather than a self-contained entity. Third, the findings illuminate the role of inter-firm partnerships in sustaining smaller architectural practices, underscoring collaboration as a mechanism for resilience and long-term sustainability.

The Sustainable Workspace Integration Model (Figure 1) synthesises these dimensions, illustrating how elements mapped against SDG 3 (Good Health and Well-being), SDG 11 (Sustainable Cities and Communities), and SDG 17 (Partnerships for the Goals) converge to optimise both efficiency and well-being in architectural workspaces. In doing so, the study contributes to a more holistic conceptualisation of sustainable practice within architectural consultancy, bridging micro-level workplace design with macro-level sustainable development agendas.

Figure 1. Sustainable Workspace Integration Model

In conclusion, the integration of sustainability within architectural workspaces must be recognised not as an optional enhancement, but as a fundamental necessity for achieving efficiency, resilience, and well-being. The insights drawn from Malaysian architects demonstrate that sustainable practices extend beyond environmental considerations to encompass social, psychological, and organisational dimensions of workspace design. This aligns directly with national priorities under the Twelfth Malaysia Plan (12MP), which emphasises sustainable growth, inclusive development, and improved well-being, as well as the National Policy on Climate Change (NPCC), which advocates for low-carbon and climate-resilient development. At the global level, the findings resonate with the United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), SDG 11 (Sustainable Cities and Communities), and SDG 17 (Partnerships for the Goals).

By addressing persistent challenges, such as financial constraints, limited awareness, and resistance to change while capitalising on opportunities for education, regulatory support, and inter-professional collaboration, the architectural profession in Malaysia

can position itself at the forefront of sustainable development. Ultimately, embedding sustainability in architectural workspaces not only advances the profession but also contributes meaningfully to the national and global agenda for a healthier, more inclusive, and future-ready built environment.

Research Contribution

Firstly, the integration of sustainable elements into architectural workspaces significantly enhances the overall efficiency and functionality of these environments (see Figure 1). The model developed in this study provides a structured lens through which sustainable practices can be operationalised within architectural consultancy practices. Unlike previous research, which often isolates design or managerial factors, this model highlights the interdependence of multiple dimensions in shaping sustainable outcomes. Architects emphasise strategies such as incorporating energy-efficient systems, maximising natural lighting and ventilation, and adopting green building materials. These approaches not only reduce operational costs but also contribute to healthier, more productive workspaces, reflecting both global best practices and Malaysia's regulatory frameworks.

Secondly, the findings demonstrate that sustainable design has a direct and positive impact on occupant well-being. Enhanced indoor air quality, ergonomic layouts, and the integration of natural elements such as plants and water features collectively improve both physical and mental health. Architects in Malaysia increasingly recognise that sustainability must extend beyond environmental performance to encompass social and psychological dimensions, thereby supporting holistic workplace well-being.

Nevertheless, several barriers continue to hinder the wider adoption of sustainable practices in architectural workspaces. Financial constraints, limited stakeholder awareness, and resistance to change are among the key challenges identified. Despite these obstacles, the architects interviewed in this study remain optimistic about the trajectory of sustainable design in Malaysia. They advocate for stronger educational initiatives, targeted government incentives, and cross-sector collaboration as necessary drivers to accelerate the transition towards sustainable and resilient architectural workspaces.

Practical Contributions

The implications of this research are multifaceted and significant. For practitioners, it offers a practical roadmap for embedding sustainability into design processes, underscoring the dual benefits of enhancing efficiency and promoting well-being. Rather than treating sustainability as an optional add-on, the study urges firm leaders to embrace it as a core element of organisational culture.

For policymakers, the findings highlight the importance of establishing supportive frameworks and incentives that mainstream sustainable practices within the architectural

industry. In particular, the study recommends that the Board of Architects Malaysia (LAM) incorporate sustainable workspace standards into professional guidelines and Continuing Professional Development (CPD) modules. It further proposes that the Uniform Building By-Laws (UBBL) be revised to integrate wellness, inclusivity, and environmental considerations in the design and management of architectural workspaces.

For architectural education, the research underscores the need for universities and training institutions to prepare students not only in the fundamentals of building design but also in the application of sustainability within workplace environments. Embedding modules on workspace well-being and management into curricula is crucial to bridging the gap between academic preparation and professional realities.

Finally, for the wider community, the study reaffirms the central role of sustainable design in cultivating healthier, more resilient, and resource-efficient workspaces. It illustrates how Malaysian architects collectively frame environmental, psychological, organisational, and community dimensions as the four pillars for optimising architectural workspaces, while also recognising the current challenges and limitations that must be addressed.

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