

COMMENTARY ON CASE STUDIES

SUSTAINABLE AND CONNECTED: CHALLENGES OF ADOPTING DESIGN APPROACH FOR WORKPLACES

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ABSTRACT

This paper presents contextual factors that drive integration of sustainable design practices in the workplace. The objective is to study pro-environmental principles in the management of energy, resources, and interior designing to examine the advantages of sustainable workspace designs in enhancing health, productivity, and social engagement. Research scopes the conceptual definitions of sustainability to understand how human behaviours are linked to the problem. Insights on workplace design strategies are discussed in a case study of American networking and tech conglomerate, Cisco Systems, Inc., to evaluate the potential of sustainable design applications in developing connected work cultures. Findings signify that beneficial aspects of environmental and social wellbeing are key motivations to adopt sustainable designs. In doing so, however, architectural and interior designers must surmount stakeholder perceptions in accepting and adopting workplace sustainability and implementation costs. To overcome these barriers, recommendations will focus on changing perceptions, educational and social responsibility initiatives.

Keywords: *Commercial Workplace, Environmental, Human-Centred Design (HCD), Office, Sustainability*

INTRODUCTION

This paper looks at human design-driven approaches for office workspace as pragmatic solutions to close the gaps of sustainable design practice. Human-Centred Design (HCD) approaches play an arguably important role to enhance user health, physical comfort, performance, and social interaction, as well as to overcome burdensome costs of utility, purchasing unnecessary equipment and maintenance. HCD approaches have been found to result in reduced dependency on physical labour, enabling cost savings, productivity and morale boost (World Green Building Council, 2014). The main objective of research in this paper is to show sustainable work environments play an important role in reducing environmental footprint by resolving challenging problems of pollution, waste management and resource use. Against these currents of demands, how exactly sustainable buildings design play a role in the commercial economy. To address key barriers of sustainable approaches, a study of relevant literature enables understanding of the perceptions of pro-environmental design in the workplace, and to recommend strategies on how design sustainability could be inculcated to deliver health, social wellbeing, performance, and productivity benefits. In achieving these goals, sustainable commercial office designs play vital roles in supporting the economic, environmental, and social outcomes of enterprises and organisations (USGBC, 2015). To foster sustainable organisational cultures, commercial design researchers must ask: *How do commercial interior designs complement*

spatial layout, operational utility and cost-efficiency of offices? How do workspace designs shift organisational cultures to ensure behavioural change for improving productivity and wellbeing among building users and occupants?

BACKGROUND OF THE STUDY

American architect Buckminster Fuller once said, "Waste is a sign of poor design; pollution is a measure of inefficiency". It implies pollution to be the inevitable consequence of collective human decisions on environmental issues. Increasing damages wrought to the environment over the last century has taken a toll on populations, producing serious consequences to health and wellbeing, with remedial solutions now taken to global levels. The objectives of sustainable design development initiatives in 1990s until the last decade were generally targeted to reduce the depletion of natural resources by more efficiently conserving non-degradable and non-recyclable resources, and through better waste management (Radjiyev et al, 2015).

Sustainable organisational cultures are the products of HCD approaches based on policies implemented and evaluated, as informed by HCD methodologies to maximise beneficial effects, while minimising environmental damages over the entire lifecycle of infrastructure and systems (Vezzoli et al, 2018). Hypothetically, HCD is assumed to work for the benefit of society or a community, but it should also be noted that the method is just

as impactful in changing behaviour through designing purposeful interaction with the environment.

HCD approaches are critical for its wide ranging economic, social and environmental contributions. A review of HCD methodologies by Rodrigo Magalhães (2018) clarifies emerging innovation models from naturalistic observations to demonstrate how HCD shape organisational culture through studying users' interactional behaviours with the external environment. The quality of human-centred workspaces is also determined by its utility to specific users in given periods of time, based on physical conditions, return on investments into innovative designs and employee attitudes (Figure 1). Characteristics of sustainable workspace designs are assessed in terms of fitness for different types and natures of work activities, and the design elements which prioritise reduction of costs and energy in human performance (Waber et al, 2014).

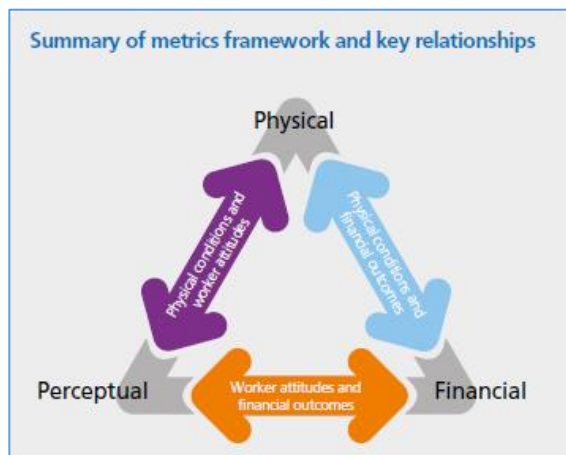


Figure 1: Framework for measuring impact and relationships

To further explore the areas of challenges in client adoption of pro-environmental strategies, a review of current sustainability design literature is provided in the following section.

Understanding the Challenges of Building Sustainable Designs

Commercial offices are a fundamental symbol of organisational culture achievement. Traditional task-based characteristics are founded predominantly on the vision of business owners based on the nature of trade, manufacture or commerce, rather than what was needed to optimise workspace utility. Designing was limited to functional spatiality, a conceptual representation of the philosophy of the organisation.

Architecture, interior and landscaping and related disciplines were not traditionally seen to actively engage stakeholder groups and users

of public spaces, such as employees. The human design factor has been a consistently weak component of research to find solutions to creating meaningful interactional workspaces, leading to a lack of directives in work culture change policies as reflected in uptake of pro-environmental designs for commercial buildings, which often slow the speed of urban changes.

Many aspects of traditional building designs do not solve the challenges of planning for environmental health, as commercial building owners may not invest sufficient resources and attention to understand how human behaviours, commuting, energy and space consumption, are linked with prevailing variable conditions which require human-centred design response (Williams, 2007: p.xxiii).

However, recent anecdotal evidence, environmental impact assessments and industrial research studies demonstrate that unsustainable construction designs incur high costs to human health in terms of health, safety, comfort and productivity, and having a sense of connection to their surroundings (Moxon, 2012). One main aspect of design sustainability is the emphasis on resource dependency, material usage reduction and cost savings.

Sustainable built approaches in commercial designs require significant attitudinal shifts since passive energies such as solar, wind, water, gravity, or tide cycles have not been normally conceived of, as *forms of energy*, creating barriers to be accepted as solutions in building design strategies aimed to avoid or mitigate effects of energy consumption (Bougdah and Sharples, 2009). Another aspect of attitudinal perceptions is investments into industrial innovations and smart technologies which integrate greener construction and designs (WGBC, 2014: p.13).

Illinois State University environmental designer Susan Winchip (2011) believes critical depth of knowledge of *indoor environmental quality* (IEQ) is important for organisational culture improvement strategies in the long run. She notes that IEQ factors such as indoor lighting, thermal quality, ventilation, temperature, distracting acoustics, exposure to contaminants, and the psychological benefits of healthy and natural surrounding views are evidence-based assessment criteria that can be useful in determining costs versus benefits management puts into employee healthcare, productivity and performance of building occupants in the medium and longer term.

Fellow of American Institute of Architect FAIA Vivian Loftness et al (2007), researching commercial building construction and design of

built environment, classified office equipment, furniture, flooring, paints and coatings, adhesives and sealants, wall coverings, wood products, textiles, insulation and cleaning products as harmful environmental pollutants. These concur with studies pointing out the lack of environmental consideration as management decisions that arise during the decision-making process (Pikaar et al, 2007: p.149). Clients who lack workspace design planning knowledge would view related costs apprehensively, and invariably assume the costs of conventional materials (e.g. flooring) would be cheaper, without proper accounting for replacement or maintenance costs of the entire material lifecycle (Loban and Jones, 2008).

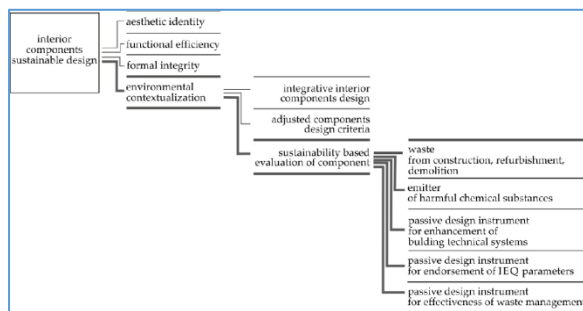


Figure 2: Adaptive reuse sustainable design strategy

Design theorist Magdalena Celadyn (2019) propose the use of a ‘circularity model’ by framing contextual application of sustainable designs with practices of conservation (Figure 2). These strategies include adaptive reuse through reclaiming, recycling, salvaging post-construction materials, or refurbished components from building demolition to fulfil the goal of better waste management and resource efficiency. The applied principles of sustainability emphasise “reduction, reusing and recycling” are found throughout the processes in designing interiors, ranging from consideration of durability and flexibility to cut down on material and spatial usage. Reusable materials from renovation works and sites designated for tear down projects involve salvaging asphalt, ceramic, concrete, metallic and plumbing fixtures, doors, cabinets, windows, carpet, brick, light fixtures, ceiling and floor tiles, wood, and decorative items. Recycling collects, processes and ultimately regaining purpose for discarded materials (Stelmack et al, 2014: pp.76-77).

User Perceptions: Aesthetics versus Sustainability

Over the years, developers and construction sector stakeholders, in spite of increasing awareness about green buildings, have excluded sustainable options due to clients’ strong resistance to change and the implicative costs involved (Chan et al, 2016). Ultimately, aesthetics of looks and cheaper materials take

precedence in decision making. In some cases, adoption barriers centre on perceptions of “what looks good”. For example, dark hues may look trendy compared to conventional paints, but dark interior walls need proper lighting and ventilation, to avoid the effect of congestion and cramming. Where the selection of materials, products, appliances and furnishings are concerned, other perceptual obstructions persist; associations with ecological solutions as “home-grown and dull” (Bonda and Sosnowchik, 2007: p.19) often lead to decision dilemmas between the desire for aesthetics or sustainability.

Design sustainability may also be perceived by non-design literate communities as an evolution in improving work culture, but the goals may not fulfil every need. Take the instance of floor layout. Workspace innovations such as open floor plans, hot-desking or shared workstations are designed to encourage collaborative culture and ultimately reduce spatial uses, but this could make them ineffective for work that requires privacy, less noise distractions, or introversion (Evans, 2020). The contribution of research to user perceptions of benefits should be gathered by field observations of the links between workers’ psychological control over their personal space, and that found in social or group interactions with others (Huang et al, 2004).

Architectural design students exposed to sustainable models have been shown in surveys to be sensitive to the current situation, but some investigations indicate nonplussed attitudes, the lack of what they actually know and what they care about leading to the assumption that the environment is generally “invincible” and will regenerate in spite of suffering corollary damages from human development activities (Ruff and Olson, 2009).

Walter Filho (2015) who studies environment and technology considers institutions such as universities and higher learning academies and institutions to be ideal “living labs” for work culture change best practices, as students are both stakeholders and part of the broader local community who benefit from theoretical and curriculum exposure on sustainability design applications. Students have access and opportunities to conduct experiments and gather direct insights by adopting sustainable lifestyles, working and living and from research engagements.

Ethics and Social Responsibility

Studies on environmental responsibility among interior designers by *International Interior Design Association*, IIDA (2016) found huge differences between interior designer’s

perception and their actions. Surveys show concurrence with the notion of promoting sustainable interior design options to clients, but only 37% actually do so as a part of their professional responsibility” (Kang and Guerin, 2009, cited in Templeton, 2011: p.55).

Architects and building planners are responsible in adhering to the guidelines of construction that affect the quality and the welfare of occupants in indoor work environments (Loban and Jones, 2008; Loftness, 2007). However, sustainable development knowledge continues to be a challenge for architectural designers. Some trends are “significantly more demanding” on construction practices. For instance, the water conservation criteria under *US Green Building Council (USGBC), Leadership in Energy and Environmental Design* or LEED® is higher today in comparison to LEED® certification requirements in 2009 (Kubba, 2012). Inevitably, incremental benchmarking standards might produce objections to practicing sustainability for smaller institutions or facilities (Kang and Guerin, 2009, cited in Bacon, 2011: p.14). Further, Templeton (2011: pp.14-16) found environmental issues to be a top concern among designers who juggle with the pressures to embrace pro-sustainability concepts when pitching design solutions, and simultaneously to convince clients of *their* social responsibility role.

The Triple Bottom Line concept of *economic, environmental, and social sustainability*, adopted more than a decade ago by the U.S. Green Building Council (2015), is a useful framework in cost vs. benefit assessments of profitability, while encouraging a shift in awareness towards more holistic benefits (Hungerford, 2010, cited in Templeton, 2011: p.14).

Katherine Arbutnott (2008) suggest that client education aimed at modifying or altering behaviours need to be the bedrock of management support for the work culture shift towards a sustainability mind-set. Other researchers examine how attitudinal barriers through educational initiatives and shared experiences help overcome reluctance, and correct misperceptions among building owners about sustainability standards and guidelines, perception of dull aesthetics, budget constraints, and other financial costs issues (Bonda and Sosnowchik, 2007).

Overall, literature suggest that naturalistic field observations and assessment of perceived risks/benefits and psychological impacts of pro-environmental designs are crucial to determine satisfaction of workplace safety, performance quality, and productivity (Fowler and Rauch, 2008, in Templeton, 2011). Neglecting indoor design aspects will lead to poor overall

organisational performance outcomes. Advocacy of pro-environment designs is therefore critical for organisational culture preservation. Work settings are designed to mediate and promote meaningful social relations, as intentionally engaging employees with smart spatial solutions enable higher productivity and improve perceptions of client’s ethical responsibility in investing into worker satisfaction through design solutions (Kim et al, 2020). Literature shows that the burden of proof lies on designers who must take a determined and precise position in introducing work culture change through creating design solutions for commercial buildings and offices.

EVALUATION OF THE CASE

In studies of sustainable designs, it has been noted from literature that HCD approaches tended to orientate in terms of solutions rather than the evolutionary requirements of planning and measuring how these are aligned with broader sustainable goals. A case study of Cisco Systems, Inc. is presented in this section to formally investigate the relationship between sustainable commercial workplace design and assessing its long-term environmental impact on stakeholders. Cisco Systems, founded in 1984 and headquartered in San Jose, California, is a multinational corporation that designs and manufactures networking equipment such as IP routers and protocols. It was ranked 15 in Interbrand’s Best Global Brands (Interbrand, 2019), with strong internal factors such as governance driving this achievement (Figure 3). Over the years, Cisco has been focusing on sustainable approaches in its office designs, setting up a real estate subsidiary which manages 400 buildings in ninety countries, including “the design, planning, construction, security, maintenance, sale and disposal” of 16 mil sq. ft. of space (Cisco IT Case Study, 1992-2007).



Figure 3: Cisco Systems Corporate Social Responsibility (CSR) Report 2019

Cisco performed an initial identification of the problems and challenges of employment productivity and the rising costs of real estate for commercial businesses in the 1990s (Cisco

Solutions, 2019). In its evaluation of office design sustainability, *Cisco Workplace Resources* (CWR), a pilot project that eventually spanned 15 years, carried out environmental impact assessments associated with material use, as well as workshops to create awareness on the reduction of utilities, maintenance costs and improvement in productivity and connectivity through shared and collaborative spaces, while studying work culture change at Cisco Systems. The Connected Workplace redesign strategy was fully rolled out by 2007 (Cisco IT Case Study, 1992-2007).

Findings found the scope of working styles had become less constricted; 20th-century ‘cubicle-to-cubicle communication’ modes have made way for spatial democratisation and encouraging collaborative work culture shifts due to the company’s flexible employee recruitment and retention policies of *when*, *how*, and *where* people work. Additionally, critical solutions to rising operational and real estate costs were needed as the CWR studies found half its employees had to shift work hours in accordance to respective time zones of its global offices and clients’ regions, resulting in redundancy of half its office spaces on any given day (Cisco Solutions, 2019).



Figure 5a: Privacy to work or have quiet chats in open rooms

In terms of pro-environmental changes, Cisco’s sustainability policies today are reflected in its commercial operations and supply chain by annual monitoring and tracking of energy consumption and *greenhouse gas* (GHG) emissions, while planning to attain next-level sustainability goals ahead of schedule. It reported having exceeded its goal by 115% in avoiding 1 mil tons of GHG from the years between 2012 and 2020 (Figure 4). The key actions in achieving its environmental sustainability objectives were framed for future-forward scopes of actions for 30% GHG reduction until 2030 (Forbes, 2019).



Figure 4: Cisco Environmental Sustainability Goals

Through eight years of annual assessments in between 2010 to 2018, 73% of Cisco employees self-reported satisfaction at work, while productivity was estimated to be worth US\$811 mil in incremental value. Findings after the CWR also showed productivity improvement, saving of 7.5 mil sq. ft. of office space, avoiding 27650 gallons of fuel, eliminating nearly 60 thousand tons of yearly carbon dioxide emissions from working commutes, reducing annual operating expenses by US\$4295 mil. Cisco’s San Jose operations were consolidated to 39 buildings from 60 previously; the sales of redundant assets which brought it nearly US\$300 mil (Cisco Solutions, 2019).

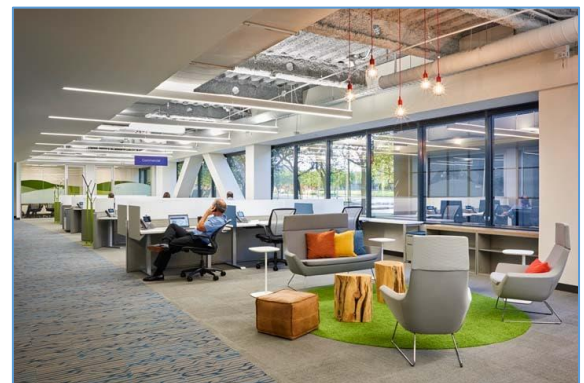


Figure 5b: Open collaborative spaces that free employees to think and feel connected

Stakeholder identification is a crucial framing of its environmental agenda and enables more stringent monitoring and reporting quality in gathering data and feedback on issues of “who works where”. Interior floor plans are designed to suit the evolving parameters of technologies in connecting employees in the workplace, and Cisco seems to show an early and positive embrace of technological innovations that requires less (or overlapping) space utilisation for its workers, both in closed and open environments (Figures 5a and 5b).

Priority Topic	Materiality Question	Related SDG	Supporting Strategies and Programs	Cisco Public Goal
Local community impact	Ensuring Cisco resources and employee contributions to engage, educate, employ and offer positive change within local communities, including economic and employment opportunities and addressing social inequalities.	Class Aligned Target 1.1	Class Aligned Target 1.1	Class Aligned Target 1.1
Economic inequality	Addressing economic inequality globally and in local communities, including investments and programs that are having a positive impact on the technology economy.	Class Aligned Target 10.2, 10.4	Class Aligned Target 10.2, 10.4	Class Aligned Target 10.2, 10.4
IT solutions for the environment	Providing new solutions and enabling existing products and services to provide environmental benefits, including energy efficiency, e.g., enabling connected cars, and intelligent energy and transportation services.	Class Aligned Target 7.2	Class Aligned Target 7.2	Class Aligned Target 7.2
Energy & GHGs	Efforts to reduce energy consumption and GHG emissions across the value chain, including product use, our own operations, and those of our suppliers, focusing on product efficiency, operational energy efficiency and conservation, and renewable energy.	Class Aligned Target 7.3, 13.1, 13.2, 13.3	Class Aligned Target 7.3, 13.1, 13.2, 13.3	Class Aligned Target 7.3, 13.1, 13.2, 13.3
Material use & waste	Reducing material use and waste from our products and packaging operations, and supporting those in the value chain, including our suppliers, to reduce their own material use and waste, including our suppliers, through our design and packaging programs and other initiatives, including our design and packaging programs and other initiatives, including our design and packaging programs and other initiatives.	Class Aligned Target 12.2, 12.4, 12.5, 12.7	Class Aligned Target 12.2, 12.4, 12.5, 12.7	Class Aligned Target 12.2, 12.4, 12.5, 12.7

Figure 6: Sustainability Materiality Tiers

Materiality assessment studies are undertaken consultatively with domestic and global alliances, as well as discussions with multilateral organisations such as local councils, environmental non-profits, supply chain partners and government agencies to better extend the impact and reach of Cisco’s CSR programmes (Boynton, 2019a). The company produce databases including “stakeholder inquiries” which generates critical information on environmental advocacy performance indicators to ensure visibility of materiality tiers (Figure 6) to internal management and employees, as well as external stakeholders such as customers, supply chain partners, investors, researchers and media. Another undertaking which reflects Cisco’s public accountability is the mapping of implemented sustainability programmes such as management and disposal of operational wastes from laboratories and offices with *Global Reporting Initiatives* (GRI) Standards (Figure 7), or aligning its CSR efforts with the framework of 17 global goals designed by the *United Nations* (UN) *Sustainable Development Goals* (SDGs) (Boynton, 2019b).

GRI Topic-Specific Standard	Related Planet Section
301: Materials	Product & packaging materials
302: Energy	Energy & GHG emissions
303: Water and effluents	Water Effluents (liquid)
304: Biodiversity	Biodiversity (including land use)
305: Emissions	Non-GHG emissions
306: Effluents and waste	Effluents Solid waste from operations (“trash”)
307: Environmental compliance	Environmental sustainability approach Environmental compliance
308: Supplier environmental assessment	Environmental sustainability approach Supplier environmental performance

Figure 7: Mapping Cisco environmental performance against GRI Standards

In discussing the company’s “Environmental Sustainability Approach” (Cisco Systems, Inc., 2019: pp.134-209), the business’s governance features of environmental design focus on a few aspects to align with global environmental challenges, product and packaging materials handling; energy and GHG emissions; design for water and effluent recyclability; biodiversity of land use and operation sites (to promote

wildlife nesting); recycling marking on plastic components; reduction of packaging and fulfilment in logistics; design for longevity, upgradability and compatibility with product trade-in, take-back and recycling programs. Energy efficiency, GHG emissions and energy costs are mapped as measurable targets and impacts to be audited against baselines in Cisco’s dealings with suppliers for material sourcing and manufacturing (Cisco Systems, Inc., 2019: pp.150-156).

KPI	FY15	FY16	FY17	FY18	FY19
Number of projects implemented	165	103	103	145	48
Annual energy avoided, GWh/yr	47.1	31.2	40.1	32.4	19.4
Total estimated annual CO ₂ e savings, metric tonnes CO ₂ e/yr	22,500	12,400	23,600	10,300	7,100

¹Does not include renewable energy purchases.

Figure 8: Cisco’s Energy and GHG emission reduction projects

Since 2012, Cisco has built energy-efficient facilities that help cut down energy consumption and environmental impacts. In 2019, its *Global Energy Management and Sustainability* (GEMS) initiative invested US\$9.3 million to implement 48 energy efficiency projects, not including renewable electricity purchasing or energy generation on-site for its buildings, labs and data centres (Figure 8), which avoids energy consumption and contributes to environmental goal-creation for sustainability achievements until 2022 (Cisco Systems, Inc., 2019: pp.161-162).

DISCUSSION AND PROPOSED SOLUTION

Based on the case study investigation, it points to solutions to mitigate the negative impacts of energy consumption on the environment as crucial for sustainable practices. Sustainable designs today reflect organisational culture adaptation to the changing nature of work, automated, complex, and highly collaborative (Cisco Systems, Inc., 2013). Enterprises must be willing to engage stakeholders in CSR programmes in alliance with pro-sustainability NGOs and agencies to create awareness about resource use. It is also important for businesses to learn the basic processes in the production and management of renewable and non-renewable resources to ensure sustainable future supply. Another recommended tactic is for designers and architectural planners to offer more tangible, immediate and measurable results to building owners on sustainable performance and cost savings (USGBC, 2015).

Poor organisational design decisions determine variable outcomes in human performance, vulnerability to stressful conditions and injuries, higher costs of ill health leading to loss of productivity and working days (Pikaar et al., 2007: p.114; WGBC, 2014: p.7).

Unsustainable offices which had once boast of lavish usage of metal, stone, wood, and other non-renewable materials (such as timber) are now viewed (metaphorically and literally) as obstacles and barriers in fostering employee communication and improving networking and performance at workplaces. In overcoming the barriers to sustainable workplaces, designers may find lessons on work culture improvement in the methods implemented by Cisco to enhance sustainability in reducing the costs of doing business with an eye on contributing substantially to environmental management.

Data of workplace redesign solutions prove Cisco had boldly tapped into HCD principles to produce self-evident results which support the key argument that employee health, wellbeing and productivity were the “heart of the business case” for designing its buildings, operations and workplaces sustainably (WGBC, 2014: p.6). As Cisco CEO stated, when technology and workplace design is seamlessly integrated, the outcome would be “an incredible experience” (Cisco Connected Workplace, 2019). The broader implication of sustainable workplace design on changing work culture is significant. More pro-environmental office design approaches reflect an increasing scale of environmental consciousness among designer practitioners and clients, and clearly suggests that open discussions are necessary to overcome reluctance and misperceptions. This paper thus propositions that *sustainable workplace designs equals good economics*.

It is the responsibility of architectural and interior designers to offer sustainable design ideas to clients, but many could find the process of educating a stumbling block and troublesome, and this may result in unviable client relationships in the long term. The outcomes of sustainable design would ultimately be determined by what the client wants. Despite the difficult task of implementing change, a conscious adaptation to “every savings count” ethos could be cultivated during dialogues. For instance, decision makers should be prompted to seek ways to reduce real estate and utilities costs, or to provide more flexibility of layout and design of overlapping functions as better suited to minimise spatial uptake, lower worker densities and decrease environmental distractions (WGBC, 2014: p.34). These include discussions on the effectiveness of open spaces, the placement of walking paths, cubicle or desk-bound versus collaborative zones.

Sharing perspectives on boosting employee performance, health, and wellbeing through design solutions are necessary to value-add change in work cultures that are already shifting with technological advancements. At

the same time, public awareness campaigns and educational initiatives must supply adequate, objective, and transparent information for organisations to rethink and prioritise sustainability goals in work environments. In this, higher learning institutions are the ideal exchange platforms to create cultural and social awareness among the present cohorts of architectural and interior design students to encourage long term attitudinal shifts that would someday be applied at their workplaces (Filho, 2015).

CONCLUSION

Since organisations and industries operate in a state of constant innovation, architectural designers must understand the equilibrium between sustainable designs and urbanisation. To enhance workplace culture, improve productivity and engagement, aesthetics and sustainability must sync harmoniously in aspects of architectural and spatial planning, with idea contributions from client as key stakeholders. Materials damaging to the environment in the long term is a crucial factor to bring up during planning dialogues. In this regard, better supply chain incentivisation of materials, resources and utility costs could make environmentally responsible concepts more viable and attractive. As noted by Daniel Quinn (Stelmack et al, 2014: p.4):

“Designers [...] understand that there is never one right way to design anything. Searching for new solutions, creatively adapting what we know into what we need and solving problems are what designers do. Perhaps then, we as designers need to expand our vision to include sustainability and start showing ordinary people how to look at the world from a green design point of view.”

To sum, sustainable design plays an important role in maintaining a healthy, nurturing and productive working environment. Unsustainable building designs is the outcome of unresourceful usage and wastage of materials due to not accommodating and adapting to change, creating vulnerable infrastructures that suffer obsolescence from inefficient practices. These need to be eliminated by ensuring workplace design integrate a full spectrum of practical, cost-effective approaches to enhance perceptions of sustainable designs that fosters performance and core communication and behavioural values. Research also substantiates cost reduction for long-term change in management mind-sets as key aspects to boost pro-environmental acceptance. Designers and architects are responsible to promote sustainable designs to clients and stakeholders as *essential, rather than alternative solutions*.

Keeping updated with knowledge on sustainable materials, construction methods, and the benefits of successful sustainable design experiences are also important to overcome attitudinal aspects of design challenges such as lack of exposure and awareness, psychological constraints to adapt to behavioural changes, or financial limitations.

ACKNOWLEDGEMENTS

Writing this paper has truly been an experience that I will not soon forget. I am grateful for the selfless guidance that I received from my cluster. Particularly, I offer my sincerest gratitude to Pinky Khoo for her linguistics support and advice, also for suggesting alternative modes of thought when I found myself at a creative impasse. I am thankful to my family and friends have given this work so much support that it would be invidious to list names; with one exception.

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