Qualitative Study of Sustainability Policies and Guidelines in the Built Environment

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Cheng Siew Goh[1], Lynne Jack[2], Arun Bajracharya[3]

[1] Heriot-Watt University Malaysia, Putrajaya, Malaysia; c.goh@hw.ac.uk

[2] Heriot-Watt University Malaysia, Putrajaya, Malaysia; l.b.jack@hw.ac.uk

[3]The British College, Kathmandu, Nepal; arun.bajra@gmail.com

Abstract

The uptake of sustainability in the built environment is, to a significant extent, influenced by international and national policies, and regulatory frameworks. However, few studies examine the roles of sustainability policies and guidelines in supporting a balanced development of sustainability in the built environment. The purpose of this research is to evaluate the use of such policies and guidelines for promoting sustainability goals in the built environment. In-depth interviews were conducted with a range of construction professionals to investigate the direct application of sustainability policies in practice. Result indicates that construction stakeholders often adopt ISO standards and regional green building assessment certifications such as LEED as a strategic framework in guiding them towards sustainable practices. However, it appears that there is a general lack of enforceability to ensure implementation. The proactive uptake of sustainability policies is vital to help address the multiplicity of often-complex sustainability issues that apply within the built environment sector. The outcomes of the research show that stakeholders should incorporate aspects such as life cycle management and integrative assessment into all sustainability plans in order to avoid conflicts that can arise from potentially conflicting stakeholder requirements.

1.0 Introduction

Sustainability emphasizes the principle of resource efficiency and aims to strike a balance in developing the environment, society and the economy. There has been extensive use of resources in construction, from raw material extraction through to the impact generated by the construction and operation of buildings. To realize the goals of sustainable development, a range of stakeholders operating throughout the supply chain are required to coordinate and collaborate to be able to address the complex and broad issues integral within any sustainability agenda in the built environment.

The built environment encompasses man-made or modified structures created for living, working and recreational purposes and it includes infrastructure used to deliver services such as water and electricity as well as to support the transportation systems (EPA, 2018b). The built environment is made up of buildings, open spaces, roads, utilities and infrastructure and it normally separates spaces from the natural environment.

The widespread impact of the built environment sector on the environment, society and economic development is well recognized. According to Mistry (2007), the construction sector consumes approximately 3 billion tons of natural materials across the globe each year and produces around 30% of the solid waste stream in most of the world's developing countries. The GABC (2016) also confirms that the sector is responsible for 40% of worldwide energy use, 30% of energy-related greenhouse gas emissions, nearly 12% of water use, and almost 40% of waste. However, construction also generates approximately 3% - 15% of national Gross Domestic Products (GDP), across both developed and developing countries. Considering these substantial impacts, the built environment plays an unquestionably significant role in both maintaining the economy, in enabling the biodiversity and in effecting the mitigation of climate change impacts.

According to United States Green Building Council (2017), buildings in the United States surpassed both the industrial and transportation sectors and generated almost 40% of national carbon dioxide emissions, but LEED-certified buildings are found to have lower carbon dioxide emissions, consume lesser energy and water, and have diverted more than 80 million tons of waste from landfills. In Japan, green and sustainable buildings could yield energy savings, cost savings and improved health for building users, in addition to significant carbon reduction (Balaban and Oliveira, 2017). The environmental, social and fiscal benefits demonstrate how significant the built environment would contribute to the global sustainable movement. By introducing appropriate proactive measures, the built environment offers a great potential in attaining the sustainable development goals.

1.1 Global and National Regulatory Frameworks and Plans for Sustainable Development

The uptake of sustainability in the built environment is, to a significant extent, influenced by the international and national policies, and regulatory frameworks. The introduction of the Brundtland Report in 1987 marked what is often seen as the start of sustainable development movement. The recent launch of the United Nations 17 Sustainable Development Goals (SDGs) in January 2016 has also supported the agenda for global sustainability.

Since 1987, various regionally-based and country-led efforts have been made in support of sustainable policies, plans, strategies and frameworks. In the United Kingdom, sustainable development has been supported by the strategic priorities of Construction 2025, a policy paper jointly contributed to by government and industry. The United States is also committed to sustainable development goals by implementing federal requirements and guidelines such as the EO13834: Efficient Federal Operations; Energy Independence and Security Act of 2007, Guiding Principles for Sustainable Federal Buildings (EPA, 2018a). The European Unions has addressed sustainability objectives through sectoral policies and programmes such as the EU Sustainable Development Strategy, the EU 2020 Strategy and EU's Better Regulation Agenda. In China, the Chinese government has implemented new regulations and laws such as

105 the Environmental Impact Assessment Law, the Regulation on Energy Conservation in Civil Buildings and
106 the Action Plan for Promoting Green Buildings (Chang et al., 2016). Australia has also established a
107 strategy for sustainable development by legislating minimal mandatory codes with higher levels of
108 voluntary compliance to meet carbon emissions targets (Martek et al, 2019).
109
110 The role of legislation and government strategies in the transformation towards a sustainable built
111 environment has been greatly acknowledged in literature. Numerous studies (Chang et al., 2016; Goh, 2014;
112 Opoku and Fortune, 2003; Vierra, 2019) identified government policies and legislation as the key driving
113 force for sustainability in the built environment. According to Goh (2014), government policies and
114 regulatory frameworks significantly influence on the uptake of sustainability in construction as supported
115 by legislative intervention. Chang et al. (2016) also found that state-level legislation offers meaningful
116 progress towards sustainability and the mandate of government policies introduces regulatory pressures to
117 stakeholders to adopt sustainable construction practices.
118
119 In order to meet the sustainable requirements set out in national and international policies, construction
120 organizations must be able to map sustainability targets to their daily operation and management strategies.
121 There are two mainstreams of sustainability-related approaches applied in the built environment: a)
122 institutional strategies and policies and b) project delivery frameworks. However, few studies examine the
123 role of such approaches in supporting a balanced development of sustainable practice. Previous studies such
124 as that by Chang et al. (2016), Glass (2012), and Zuo et al. (2012) have attempted to investigate
125 sustainability policies and guidelines in construction markets from different perspectives. At the corporate
126 level, Zuo et al. (2012) examined sustainability reporting by top international contracting companies.
127 Meanwhile, Chang et al. (2016) explored the policy system introduced by the Chinese government in
128 enabling the transition to sustainable construction within China. However, there remain research gaps in
129 examining the adoption of sustainability policies and frameworks. This research therefore evaluates the use

of sustainability-related policies and guidelines in promoting sustainability goals within the built environment.

2.0 Institutional and Organizational Policy Framework

Legislation and government policies drive more organization commitment to sustainable development to ensure such efforts are aligned with the national and regional goals. Because sustainable development has been embedded as an overarching objective in the government policies and regulatory frameworks, construction businesses need to translate sustainability goals at the organizational level for implementation. Formulating organizational-level strategies and reporting is essential to develop the collective vision and values for promoting sustainability within the business by providing leadership and building a consensus for all sustainable moves. It would allow construction organizations allocate more resources in improving the corporate capability and competency in delivering sustainable development, hence building a corporate culture for sustainable development.

Organizations in construction are often project-based in which the business structure attempts to emphasize on the project dimension rather than functional structure. Because of this unique characteristic of construction businesses, a determinant of a success in implementing sustainable development is to integrate sustainability principles into the day-to-day decision making at both organizational and project levels.

Sustainable development is typically mainstreamed into organizational strategies in construction businesses to give an impetus to sustainable movement. Construction organizations employ institutional policies and strategies as a main instrument in shaping their sustainable efforts. Leading construction organizations set in-house strategies and policies or opt for compliance with voluntary sustainable reporting requirements in order to be consistent with the global institutional and local government goals in sustainable transformation. In addition, there are also numerous standards and guidance available in the marketplace to assist construction organizations in integrating sustainable development in their core business functions and

156 individual projects. Construction corporates often adopted ISO standards, sustainability reporting standards,
157 sustainability indexes and in-house sustainable policies as their strategic frameworks in realizing plans of
158 action for sustainable development goals. The following section will discuss the organizational policy
159 frameworks, standards and guidelines that are commonly employed in guiding construction corporates
160 towards sustainable movement.
161
162 **2.1 ISO-Standards**
163 International Organizations for Standardisation (ISO) developed numerous standards and guidelines to
164 support the shift towards sustainable development. In view of wide recognition of ISO standards,
165 construction organizations attempted to adopt ISO standards in meeting the sustainable development
166 requirements set by local authorities and international standard bodies. Organizations could employ a wide
167 range of ISO-standards that address either the overall sustainability goals or some specific sustainability
168 needs to demonstrate the commitment and dedication to sustainable development. Among the ISO standards
169 inclusive of a wide spectrum of sustainable development goals are ISO/Guide 82: 2014, ISO26000,
170 ISO20400 and ISO 20121 (ISO, 2019). However, ISO 14000 and ISO 26000 standards are found to garner
171 more widespread support from construction ventures in their sustainable pursuit.
172
173 Given that sustainable construction covers greater extent of environmental issues, the ISO14001
174 Environmental Management Systems is among the popular standards used by construction companies as
175 the guidance in devising and implementing their sustainability strategies. The ISO14000 series of standards
176 incorporate five standards: environmental management system, environmental auditing, environmental
177 labelling, environmental performance evaluation and life cycle assessment. It is a series of generic standards
178 providing organizations with the environmental management structure to develop, implement, achieve,
179 review and maintain the environmental policy after considering the organizational structure, planning
180 activities, responsibilities, practices, procedures, processes and resources (Ofori et al., 2000).
181

Corporate social responsibility (CSR) is often regarded as proxy of sustainability by construction corporates (Glass, 2012; Zuo et al., 2012) although the ground of sustainability is more comprehensive than CSR. The ISO 26000:2010 standard is a standard that guides stakeholders to operate organizations in a socially responsible manner by giving contributions to health and welfare of society. It examines seven core subjects of social responsibility: 1) organizational governance, 2) human rights, 3) labour practices, 4) environment, 5) fair operating practise, 6) consumer issues and 7) community involvement and development (ISO, 2010). By practising social responsibility, construction companies can improve the health and welfare of society, promote stakeholder engagement, and integrate sustainable practice throughout the supply chain network.

2.2 Global Reporting Initiative (GRI)

Organizations such as public listed companies are required to publish a sustainability report to communicate the economic, social and environmental impacts induced by daily activities to stakeholders. Global Reporting Initiatives (GRI) is a guideline produced under the effort the United Nations Environmental Programme and Coalition for Environmentally Responsible Economies (Ceres) (Talbot & Venkataraman, 2011). It is considered as one of the most widely used sustainability reporting standards globally. Construction corporates adopt GRI as a tool to present the organization values and governance model of sustainability as well as to communicate sustainability performance in a more effective manner. In addition to shaping sustainability framework at the organizational level, reporting against the GRI indicators at a project level can also help align project and corporate sustainability indicators (Talbot and Venkataraman, 2011). Although the guidance provided is very general, GRI reporting guideline documentation can still offer some guidance to the level indicators that should be considered, i.e. project, operational and corporate (Talbot & Venkataraman, 2011).

2.3 Sustainability Indexes

Leading construction companies seek to be incorporated in the global and regional sustainability indexes to demonstrate their commitments and achievement of sustainable development. These sustainability

indexes serve as a benchmark of assessing the company performance in the environmental, social and economic dimensions. For example, the Dow Jones Sustainability Index (DJSI), which was launched in 1999, is the first global sustainability benchmark used to track the stock performance of leading companies in terms of economic, environmental and social development (RobecoSAM, 2019). It adopts a rules-based selection process based on the Total Sustainability Scores. Based on the clearly defined criteria, the DJSI indexes provide global, regional and country benchmarks to companies to outperform the sustainability practices than their peers and competitors. In Hong Kong, a similar sustainability index named Hang Seng Corporate Sustainability Index is used to identify and track the sustainability performance of companies. Similarly, it also provides a benchmark for corporate sustainability investments encompassing environmental, social and corporate governance.

2.4 In-house Sustainability Policies and Strategies

Apart from regional sustainability initiatives, giant construction corporates tend to develop own policies and frameworks in delivering sustainable development goals. The establishment of in-house sustainability policies and strategies helps to demonstrate the company leadership in aligning the corporate vision, missions and values to sustainable development. In addition, long-term goals and short-terms targets of sustainable development are also clearly outlined in the organizational policies with a review of all sustainable approaches and activities implemented within the period. To effectively communicate the sustainability initiatives with the internal and external stakeholders, the common approaches of sustainability policies include online disclosure, publication of standalone sustainability reports and an allocation of a dedication section on sustainability in the company annual report (Zuo et al., 2012).

3.0 Project Delivery Frameworks and Guidelines

Apart from strategic management at the corporate level, it is also necessary to examine the application of sustainable development at the tactical level – individual construction projects. The introduction of sustainable building certification gives stimulus to green building market and there have been growing

interests and demands for sustainable buildings in recent years. Numerous sustainable building certification systems evolve to tailor the regional development needs and priorities. The proliferation of standards, ratings and certification systems in the marketplace assists construction stakeholders in delivering their sustainable building and facilities goals. The sustainable building certifications and standards are mostly developed by professional bodies and governmental departments as an effort of promoting sustainable built environment.

Sustainable building certifications play an important role in guiding stakeholders in transition to a more sustainable built environment. They give a comprehensive framework informing stakeholders on how sustainable built environment can be created and monitored. They summarize key sustainability aspects in terms of planning, design and constructing a sustainable building and set explicit thresholds of desired sustainable building performance. The certification systems are mostly local or regional specific, although they are sometimes designed to serve for the international evaluation purpose. Among the certification include BREEAM in United Kingdom, LEED in United States, Green Star in Australia, Green Mark in Singapore, BEAM Plus in Hong Kong, Green Building Index in Malaysia, CASBEE in Japan, and DGNB in Germany. These certification tools give a yardstick for measuring sustainable building performance by assessing the performance in terms of energy optimization, land use and accessibility, material use, water efficiency, environmental impacts and indoor environmental quality. Some prevalent sustainable building certifications in the marketplace such as BREEAM, LEED, Hong Kong BEAM Plus, and Three Stars are reviewed in this study considering their wide adoption in the studied area and also the worldwide recognition in the construction market.

3.1 Building Research Establishment Environmental Assessment Method (BREEAM)

The Building Research Establishment Environmental Assessment Method (BREEAM) was introduced in the United Kingdom in 1990 and it served as the first environmental building performance measurement tool (Larsson, 1998). BREEAM can be regarded as a significant cornerstone for the development of

sustainability in the built environment where the establishment of BREEAM has given a push towards the development of sustainable buildings in the global market (Vierra, 2019). In the BREEAM certification, scores are awarded for each criterion met in the assessment and the collected scores determine the rating of "pass", "good", "very good" or "excellent" in the overall building performance. There are nine categories in the certification: management, health and well-being, energy, transport, water, materials, land use, ecology and pollution, and innovation.

3.2 Leadership in Energy and Environmental Design (LEED)

Leadership in Energy and Environmental Design (LEED) was founded in 1994 under the efforts of the American Society for Testing and Materials (ASTM) and U.S. Green Building Council (USGBC) (Kibert, 2008). LEED is the principal green building evaluation system employed in the United States and it is comprised of a suite of building rating systems which including LEED – BD+C (Building Design and Construction), LEED – O+M (Building Operations and Maintenance), LEED – ID+C (Interior Design and Construction), LEED – H (Homes), LEED - ND (Neighbourhood Development), and LEED-Cities and Communities. The LEED standards employ four rating levels in assessment, namely Platinum, Gold, Silver, and Certified. The rating is determined by adding up the total points scored in the eight main categories: integrative process, location and transportation, sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality and innovation.

3.3 Building Environmental Assessment Method Plus (BEAM Plus)

In Hong Kong, a localized sustainable building assessment system - Building Environmental Assessment Method (BEAM) was developed in 1996 based on the United Kingdom BREEAM. The BEAM certification sets criteria and serves as a measurement system in Hong Kong by adopting local climate and industry needs. BEAM has undergone several revisions from BEAM 4/04 and BEAM 5/05 to BEAM Plus version 1.1 and version 2.0 for refinement and improvement to adjust to the market needs. BEAM Plus provides a guidance for Hong Kong practitioners in fulfilling their sustainable tasks. It is currently a voluntary scheme

and adopts four categories of "Bronze", "Silver", "Gold" and "Platinum" in rating the building performance across the whole life cycle. The latest BEAM Plus certification uses seven areas in defining the sustainable building performance: 1) integrated design and construction management, 2) sustainable site, 3) materials and waste, 4) energy use, 5) water use, 6) health and wellbeing, and 7) innovation and additions.

3.4 Three Star Evaluation System

Thee Star evaluation system was introduced in China to evaluate the sustainable performance of buildings. It assesses six aspects: 1) land savings and outdoor environment; 2) energy savings; 3) water savings; 4) material savings; indoor environmental quality and operational management. Compared to LEED and BREEAM, Three Star System was established by the governmental departments and it is formalised as a national standard and forms an integral part of supporting policies in China (Chang et al., 2016).

4.0 Research Method

In-depth interviews were conducted with a range of construction professionals to investigate the application of sustainability policies in practice and explore the use of sustainability policy frameworks in transition to a sustainable built environment. Semi-structured interview was adopted to probe further in exploring the studied phenomenon as queries arose during the interview while giving some consistency towards gathering information. The study used purposeful sampling method in identifying respondents to ensure that the respondents have good exposure to sustainable construction practice. The respondents came from a variety of background, ranging from engineering, architecture, facilities management, real estate, surveying and construction laws. A total of 28 interviews was carried out and all interviewees held an executive or managerial position in their organizations. The average working experience of interviewees in construction is approximately 22 years. Table 1 shows the interviewee profile in the study.

5.0 Result and Analysis

Content analysis on literature and interview findings was carried out. It is necessary to examine the application of sustainable development by exploring the use of policies and frameworks in determining the decisive extent of sustainable practices in the built environment. Examining the direct application of such sustainability policies and frameworks by construction organizations helps to determine how the organizations position themselves in the pursuit of sustainable development goals. It also reflects an organization's determination towards sustainability, thereby identifying how robust has sustainable effort made in in the context of the built environment.

The result suggests that most leading construction organizations formulate a sustainability strategy and policy to provide leadership in engaging stakeholders towards sustainable built environment. Sustainability-related visions, missions and values are officially incorporated in the company strategies to guide the sustainable implementation. As revealed by interviewee C02, C03, C05, E04, E05, E06 and E10, a sustainability policy and guidance has been formally established in their organizations to align the company businesses and operations with the sustainable targets. Key performance indicators (KPI) and targets are established internally to reduce carbon footprints and keep track of the sustainability performance. The establishment of a formal sustainable policy within the organization helps offer a systematic approach in executing sustainable initiatives within the built environment. The overarching sustainability statement allows stakeholders in the entire supply chain (ranging from internal employees to external clients and users) to understand the company devotion toward sustainable development.

Apart from organization sustainability policies, construction businesses adopt international standards widely, in particular ISO 14001 standards. Interviewees indicated that environmental standards such as ISO14001 are used extensively to assist the execution of sustainable practices in the company. In accordance with the ISO14000 standards, organizations need to devise an environmental strategy and implement the environmental management system systematically in order to obtain the accreditation. This

helps construction businesses to fulfil the requirements of delivering environmental sustainability. The organizations of interviewee D01, E09, F01, C02, C06, R01 and S01 have adopted ISO 14001 in guiding them towards sustainable practice. The following shows how ISO 14001 standards have been used by construction organizations in meeting the environmental sustainability requirements.

> "*The policy [ISO 14001 standard] is also used to serve environmental needs of community, to actively minimise impacts of business operations on the environment, and to support green building movements in Hong Kong and China*." - Interviewee F01

> "*The policy [ISO 14001 Standards] offers understanding to clients who want to know what the company thinks and how the company deals with the environment…A good practice has been operated in the company in the aspects of human relations, human resources, employment, energy reduction, paper recycling, and even being a good neighbour*." – Interviewee S01

The prevalent sustainable building certification systems also play a significant role in assisting construction stakeholders to translate the sustainable vision into actual projects. Instead of setting a specific corporate policy for sustainability, some organizations attempted to make reference to the existing sustainable building assessment systems. Majority interviewees employ sustainable building assessment tools such as LEED and BEAM Plus as an instrument in guiding their sustainable movement. Interviewee R01 revealed that his organization adopts both local (BEAM Plus) and overseas (LEED) sustainable building assessment systems as a framework for sustainable practices. Similarly, interviewee I01 also held that sustainable building certifications help to make the task of planning and designing sustainable buildings easier. The result indicates that the sustainable building certifications serve as a very useful tool, particularly to stakeholders who lack subject knowledge in sustainable construction practice. This is aligned with Shan and Hwang (2018)'s findings that advocate sustainable building rating tools contribute to four benefits: 1) establish a baseline to calibrate future performance; 2) set a basis of benchmark for alike comparison, 3)

359 promote informed decision making of sustainable practice, and 4) file documentation to comply with
360 sustainable rules and regulations.

361

362 Because sustainable development has different definitions and interpretations from various stakeholder
363 perspective, some organizations employ the corporate social responsibility policy as part of their fulfilment
364 towards sustainable development. Meanwhile, some construction corporates seek to be listed in the regional
365 and international sustainability indexes such as Dow Jones Sustainability Index, Hang Seng Sustainability
366 Index, FTSE4Good Index, Carbon Disclosure Project in applying sustainable principles. The listed
367 companies are required to adhere to the stipulated guidelines of GRI and sustainability indexes in the
368 disclosure of corporate commitment towards sustainable development. The result reinforces Zuo et al.
369 (2012)'s finding that construction organizations increasingly recognize the importance of corporate
370 dedication and achievement on sustainability and they greatly employ sustainability reporting as a form of
371 disclosure. The scrutiny of sustainability agenda by being listed in the relevant sustainability indexed are
372 welcome (Zuo et al., 2012).

373

374 Apart from that, construction businesses also set up an in-house sustainability division or a steering
375 committee group to facilitate the delivery of sustainable practice. The establishment of such sustainability
376 division was observed in the organizations of interviewee D02, E10, and R01. A director of sustainability
377 is normally appointed to champion the sustainable division or committee group. In addition to the
378 sustainable committee, interviewee E03 annotated that his headquarter took sustainable initiatives further
379 by establishing a centre of excellence for sustainability to build a consensus for each division in delivering
380 sustainable practice.

381

382 The study found that sustainability report was also employed as a means of understanding the governance
383 performance of construction corporates in delivering sustainable built environment. Construction ventures
384 publish their sustainability report annually to comply with the local and international standards such as
385 Global Reporting Initiatives and ISO standards. The finding is in line with Zuo et al. (2012)'s result in
386 which GRI is used as a reference guideline by construction companies. Sustainability reporting can be
387 prepared by documenting it in either a stand-alone report or as a section of the corporate annual report. It
388 is a form of disclosure of demonstrating the short-term organizational initiatives and long-term capacity
389 towards building sustainability. On one hand, informal frameworks of sustainable development were also
390 used to assist the decision making for sustainable practice within the built environment. According to
391 interviewee C07, his company did not establish a written framework but senior management often exercises
392 their discretion and judgement in accordance with sustainable development principles. On the other hand,
393 the study also found that some construction corporates do not develop or adopt proper sustainable policies
394 in the business operation (in the organizations of interviewee U01, C04, E02, R02 and S02) despite of the
395 corporate commitment towards sustainable development.

396

397 The research observed current regulatory frameworks may not be effective in facilitating the development
398 of sustainable built environment. The interviewees revealed that some existing design regulations and
399 planning policies could upset the advancement of developing a sustainable built environment. As indicated
400 by interviewee C07 and D01, some prevalent building codes and specifications impose limits to innovative
401 sustainable design and additional approvals are required for such modifications. The view was supported
402 by interviewee E04 where different government departments and councils are found to adopt varying
403 standards in the statutory requirements, and it resulted in discrepancies and confusion. This could dampen
404 the stakeholder interest and discourage them in adopting sustainable practice.

405

406 In addition, majority interviewees also suggested a lack of enforceability of sustainability related policies
407 and regulations. They urged an intervention from the government for a successful transformation of
408 sustainable built environment. Existing sustainable practises are mainly driven by the market force and
409 there has been a sign of a slow progress in the sustainability adoption. A top-down approach should be
410 necessitated to effectively facilitate sustainable practice in the building and construction sector. The
411 following are the excerpts of some interviewee responses.

412 "*The industry will not adopt sustainability, unless sustainable development is (made) mandatory.*
413 *For a successful implementation, two things are required – incentives and the government's*
414 *regulative framework. Singapore performs well in the field because she has a lot of incentives as*
415 *well as the mandatory requirements.*" [Interviewee R02]

416 "*Government is the big push and the government policy is the only way to make sustainability*
417 *work...People will only follow when sustainability is made as a mandatory requirement. If*
418 *sustainability serves on a voluntary basis, no people will choose to do it."* [Interviewee E10]

419 *"…A top-down approach is necessary to push the development of sustainable construction. It has*
420 *to be policy driven and…makes it as mandatory with certain incentives*" [Interviewee A03]

421 "*The government's incentives and regulations have to be put in place. The government has to make*
422 *the requirements compulsory in the practices. Without the regulations, the developers may not have*
423 *the will to do sustainability, especially those extra efforts cost them money*." [Interviewee S02]

424 "*The government should take the lead to make legislation and people will (then) comply with the*
425 *regulations since they are stated in the tender conditions*" [Interviewee E01]

426

427 Sustainability measures in construction are mostly undertaken on a voluntary basis by the industry and yet
428 the market force is found to be inadequate in driving sustainability aspiration in the absence of the

429 government support. This study is echoed by Martek et al. (2018) whereby government push is required in
430 facilitating sustainability transition. They argued that government is found to be the source of resistance to
431 sustainability adoption and they suggested to introduce push and pull (carrot and stick) measures in the
432 policy reforms of regulations, financial interventions and behavioural change programmes.

433

434 **6.0 Discussion**

435 The finding suggests that the use of either institutional policies or project frameworks has improved the
436 stakeholder awareness and understanding towards sustainable building practice. The adoption of
437 sustainable building certification tools complements the institutional sustainable policies in framing
438 sustainable movement in the built environment. The certification tools assist project clients and
439 stakeholders particularly those who have limited technical knowledge in sustainable construction practice
440 in calibrating their sustainable performance effectively. The certifications also serve as a sustainable
441 toolbox by giving metrics to measure how sound sustainable built environment is performing in a systematic
442 manner. The finding is echoed by Martek et al. (2019) that sustainable building certification systems are
443 the most recognizable mechanism and remain prime movers in delivering sustainability in construction
444 market. In the absence of sustainability legal frameworks, the certification system takes a leading role in
445 shaping the movement of sustainability in the built environment.

446

447 Apart from the sustainable building certification, construction ventures also employ institutional policies
448 or internal sustainability frameworks as a guidance for implementation. It appears that the employed
449 sustainability strategies and standards vary from organizations to organizations. Result shows that CSR and
450 environmental management are often regarded as the main mechanisms in demonstrating the organization
451 commitment towards sustainability, as social and environmental sustainability form parts of the three pillars
452 of sustainable development. As held by Glass (2012), various sub-sectors of construction adopt the

453 sustainability concept in different ways and there appears to be deficient in having common measures and
454 processes to materiality within the built environment. Previous researchers (Du Plessis, 2007; Glass, 2012)
455 also suggested the impeding factors of sustainable building practice to be lack of integration with
456 mainstream decision-making systems, few links between policies and on-the-ground realities, a narrow
457 base of participation, a lack of homogeneity in sustainability adoption, and a lack of clear priorities and
458 wish-list strategies. Although there has been an improvement in sustainable performance over the recent
459 years, the aforementioned factors are still found to be the impediment of transforming a sustainable built
460 environment. This prompts the necessity of developing more proactive measures to address the complexity
461 of sustainability issues. Future research and development should therefore focus on reducing the
462 discrepancies and promoting a more integrated, consistent and systematic approach in transforming the
463 built environment. While sustainability emphasises the capacity of building long term development, life
464 cycle management could offer a way to counter the traditional mindset of construction companies longing
465 for visible benefits and returns on a short term.

466

467 Result suggests that sustainability reporting, in-house sustainable strategies and sustainable building
468 certification are commonly employed by construction firms to demonstrate the commitments and initiatives
469 towards sustainable development. These policy frameworks are found to be applied on a voluntary basis
470 whereby there is no obligation on construction businesses to adopt the recommended measures and planning
471 in practice. The interview result also highlights that there is a lack of enforceability to ensure application
472 of sustainable practice within the built environment. According to Zhang et al. (2015), construction firms
473 are still not environmentally proactive despite of awareness and the construction industry is hardly to make
474 progress in environmental performance without external stimuli. On the same vein, to effectively reform
475 the construction and building industry, sustainable practice in construction would require more proactive
476 approaches with the introduction of mandatory policy actions in enabling the transition to sustainable
477 development. There has been evidence that mandatory adoption of sustainability brings positive impacts

478 on business performance and public perceptions (Glass, 2012). Without the external pressure, the voluntary
479 implementation of sustainable development gives a lower efficiency in attaining the sustainable
480 development goals.

481

482 Top-down approach is therefore called for to effectively drive sustainability into the built environment. In
483 the absence of legislatively mandated sustainability requirements that include penalties for non-compliance
484 and incentives for compliance, construction ventures attempt to adopt organizational goals and institutional
485 policies. However, mandatory requirements and enforceable laws are still needed to achieve greater
486 sustainability in the built environment. Government and local authorities should take the leadership in
487 claiming the responsibility of making the built environment more sustainable. There is undoubtedly a
488 general lack of clear and objective standards and policies for construction stakeholders in pursuing the
489 sustainable development goals. This has left a major gap in the current sustainable initiatives. What make
490 it even worse is that regulatory pressure towards sustainability in the built environment is seen to be reduced
491 over the recent years and it can be observed in the recent deregulatory and growth agenda by the UK
492 government. Still, there appears to be lack of triggers to incorporate sustainability within the regulatory
493 systems. A way forward of this paper is to initiate a policy reform to promote the transformation of a
494 sustainable built environment with feasible and realistic targets and devise plans of action on how to
495 coordinate the organizational efforts to reinforce the affirmative implementation of sustainability policies
496 and legislation.

497 This study gives a valuable reference on how sustainability policies and frameworks assist in delivering
498 sustainability goals at the corporate and project levels, thereby tackling the weaknesses in the transition of
499 sustainable built environment. By examining the prevalent policy frameworks adopted by construction
500 organizations, the findings would help strengthen the governance structure of sustainable built environment.
501 A systematic and standardised regulatory framework should be established to assist construction corporates
502 in aligning their sustainable initiatives with the local and national sustainability goals. It is also necessary

503 to design and develop more efficient sustainable policies to introduce strong incentives and promote
504 innovation in research and development. This could help the establishment of new legislation and acts
505 governing design and construction of sustainable practice in the built environment.

506

507 **7.0 Conclusion**

508 The result suggests that ISO standards and regional green building assessment certifications such as LEED
509 and Hong Kong BEAM Plus are widely adopted as the strategic framework in guiding construction
510 stakeholders towards sustainable practices. Nevertheless, it appears that there is a general lack of
511 enforceability to ensure implementation of sustainability policies and frameworks within the built
512 environment. It calls for more concrete plans of action for effective delivery of the sustainable development
513 goals. Creating a sustainable built environment requires hand-in-hand devotion and involvement from all
514 involved construction stakeholders. It requires consensus, collaboration and innovation and a strong
515 sustainability policy framework is a key for realization.

516

517 Proactive uptake of sustainability policies is pivotal to help address the multiplicity of often-complex
518 sustainability issues that apply within the built environment sector. This study demonstrates the extent to
519 which sustainability-related policies and guidance are adopted in the built environment in assisting the
520 transformation of a sustainable built environment. The research outcomes suggest that aspects such as life
521 cycle management and integrative assessment should be incorporated into all sustainability plans in order
522 to avoid conflicts that can arise from potential conflicting stakeholder requirements. A success of
523 sustainability cannot be gauged without a determined strategic and tactical framework. This study
524 contributes to the body of knowledge by identifying the benefits and limitations associated with the existing
525 sustainability policies and frameworks in the marketplace. It also offers some new insights into the
526 expectations of construction stakeholders towards the role of sustainable policies and strategies in the

527 transition towards sustainable development, hence accelerating the transformation of a sustainable built
528 environment.

529

530 **8.0 Data Availability**

531 Some or all data, models, or code generated or used during the study are proprietary or confidential in nature
532 and may only be provided with restrictions (e.g. anonymized interviewees and the interview data).

533

534 **9.0 Acknowledgment**

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TABLE

Table 1 The profile of interviewees

No	Interviewee Code	Experience (years)	Position
1	C01	35	Engineering and Risk Manager
2	C02	36	Chief Quantity Surveyor cum Corporate Legal Consultant
3	A03	18.5	Chairman of Green Building Council
4	E01	23	Project Director
5	D01	40	Director in Architectural Services
6	C03	12	Design Manager
7	C04	15	Design Manager
8	U01	31	Director of Planning & Design
9	E02	8	Sustainability Officer
10	E03	16	Director in Building & Technology Division
11	D02	25	Assistant director
12	C05	37	Chief Sustainable Development Manager
13	E04	26	Executive Director
14	R01	20	Associate Director & Director of Sustainable Development
15	E05	12	Director
16	S01	45	Director of project advisory
17	I01	9	Co-founder and Creative director
18	E06	7	Director of Sustainability
19	C06	26	Director
20	M01	21	Regional Head of Real Estate and Site Development
21	S02	31	Director
22	E07	28	Executive Director & Regional Manager
23	E08	6	Senior Sustainability Consultant
24	F01	22	Area Manager
25	R02	27	Director
26	E09	14	Consultant of Policy & Sustainability
27	E10	12	Technical director
28	C07	26	Vice Chairman & Managing Director