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**Qualitative Study of Sustainability Policies and Guidelines in the Built Environment**

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**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.

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## **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.

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

88

### 89 **1.1 Global and National Regulatory Frameworks and Plans for Sustainable Development**

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

95

96 Since 1987, various regionally-based and country-led efforts have been made in support of sustainable  
97 policies, plans, strategies and frameworks. In the United Kingdom, sustainable development has been  
98 supported by the strategic priorities of Construction 2025, a policy paper jointly contributed to by  
99 government and industry. The United States is also committed to sustainable development goals by  
100 implementing federal requirements and guidelines such as the EO13834: Efficient Federal Operations;  
101 Energy Independence and Security Act of 2007, Guiding Principles for Sustainable Federal Buildings (EPA,  
102 2018a). The European Unions has addressed sustainability objectives through sectoral policies and  
103 programmes such as the EU Sustainable Development Strategy, the EU 2020 Strategy and EU's Better  
104 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

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

132

## 133 **2.0 Institutional and Organizational Policy Framework**

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

143

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

148

149 Sustainable development is typically mainstreamed into organizational strategies in construction businesses  
150 to give an impetus to sustainable movement. Construction organizations employ institutional policies and  
151 strategies as a main instrument in shaping their sustainable efforts. Leading construction organizations set  
152 in-house strategies and policies or opt for compliance with voluntary sustainable reporting requirements in  
153 order to be consistent with the global institutional and local government goals in sustainable transformation.  
154 In addition, there are also numerous standards and guidance available in the marketplace to assist  
155 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



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

190

## 191 **2.2 Global Reporting Initiative (GRI)**

192 Organizations such as public listed companies are required to publish a sustainability report to communicate  
193 the economic, social and environmental impacts induced by daily activities to stakeholders. Global  
194 Reporting Initiatives (GRI) is a guideline produced under the effort the United Nations Environmental  
195 Programme and Coalition for Environmentally Responsible Economies (Ceres) (Talbot & Venkataraman,  
196 2011). It is considered as one of the most widely used sustainability reporting standards globally.  
197 Construction corporates adopt GRI as a tool to present the organization values and governance model of  
198 sustainability as well as to communicate sustainability performance in a more effective manner. In addition  
199 to shaping sustainability framework at the organizational level, reporting against the GRI indicators at a  
200 project level can also help align project and corporate sustainability indicators (Talbot and Venkataraman,  
201 2011). Although the guidance provided is very general, GRI reporting guideline documentation can still  
202 offer some guidance to the level indicators that should be considered, i.e. project, operational and corporate  
203 (Talbot & Venkataraman, 2011).

204

## 205 **2.3 Sustainability Indexes**

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

208 indexes serve as a benchmark of assessing the company performance in the environmental, social and  
209 economic dimensions. For example, the Dow Jones Sustainability Index (DJSI), which was launched in  
210 1999, is the first global sustainability benchmark used to track the stock performance of leading companies  
211 in terms of economic, environmental and social development (RobecoSAM, 2019). It adopts a rules-based  
212 selection process based on the Total Sustainability Scores. Based on the clearly defined criteria, the DJSI  
213 indexes provide global, regional and country benchmarks to companies to outperform the sustainability  
214 practices than their peers and competitors. In Hong Kong, a similar sustainability index named Hang Seng  
215 Corporate Sustainability Index is used to identify and track the sustainability performance of companies.  
216 Similarly, it also provides a benchmark for corporate sustainability investments encompassing  
217 environmental, social and corporate governance.

218

#### 219 **2.4 In-house Sustainability Policies and Strategies**

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

229

#### 230 **3.0 Project Delivery Frameworks and Guidelines**

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

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

240  
241 Sustainable building certifications play an important role in guiding stakeholders in transition to a more  
242 sustainable built environment. They give a comprehensive framework informing stakeholders on how  
243 sustainable built environment can be created and monitored. They summarize key sustainability aspects in  
244 terms of planning, design and constructing a sustainable building and set explicit thresholds of desired  
245 sustainable building performance. The certification systems are mostly local or regional specific, although  
246 they are sometimes designed to serve for the international evaluation purpose. Among the certification  
247 include BREEAM in United Kingdom, LEED in United States, Green Star in Australia, Green Mark in  
248 Singapore, BEAM Plus in Hong Kong, Green Building Index in Malaysia, CASBEE in Japan, and DGNB  
249 in Germany. These certification tools give a yardstick for measuring sustainable building performance by  
250 assessing the performance in terms of energy optimization, land use and accessibility, material use, water  
251 efficiency, environmental impacts and indoor environmental quality. Some prevalent sustainable building  
252 certifications in the marketplace such as BREEAM, LEED, Hong Kong BEAM Plus, and Three Stars are  
253 reviewed in this study considering their wide adoption in the studied area and also the worldwide  
254 recognition in the construction market.

255

### 256 **3.1 Building Research Establishment Environmental Assessment Method (BREEAM)**

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

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

266

### 267 **3.2 Leadership in Energy and Environmental Design (LEED)**

268 Leadership in Energy and Environmental Design (LEED) was founded in 1994 under the efforts of the  
269 American Society for Testing and Materials (ASTM) and U.S. Green Building Council (USGBC) (Kibert,  
270 2008). LEED is the principal green building evaluation system employed in the United States and it is  
271 comprised of a suite of building rating systems which including LEED – BD+C (Building Design and  
272 Construction), LEED – O+M (Building Operations and Maintenance), LEED – ID+C (Interior Design and  
273 Construction), LEED – H (Homes), LEED - ND (Neighbourhood Development), and LEED-Cities and  
274 Communities. The LEED standards employ four rating levels in assessment, namely Platinum, Gold, Silver,  
275 and Certified. The rating is determined by adding up the total points scored in the eight main categories:  
276 integrative process, location and transportation, sustainable sites, water efficiency, energy and atmosphere,  
277 materials and resources, indoor environmental quality and innovation.

278

### 279 **3.3 Building Environmental Assessment Method Plus (BEAM Plus)**

280 In Hong Kong, a localized sustainable building assessment system - Building Environmental Assessment  
281 Method (BEAM) was developed in 1996 based on the United Kingdom BREEAM. The BEAM certification  
282 sets criteria and serves as a measurement system in Hong Kong by adopting local climate and industry  
283 needs. BEAM has undergone several revisions from BEAM 4/04 and BEAM 5/05 to BEAM Plus version  
284 1.1 and version 2.0 for refinement and improvement to adjust to the market needs. BEAM Plus provides a  
285 guidance for Hong Kong practitioners in fulfilling their sustainable tasks. It is currently a voluntary scheme

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

290

### 291 **3.4 Three Star Evaluation System**

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

297

### 298 **4.0 Research Method**

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

309

310 **5.0 Result and Analysis**

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

318

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

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

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

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

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

346

347 The prevalent sustainable building certification systems also play a significant role in assisting construction  
348 stakeholders to translate the sustainable vision into actual projects. Instead of setting a specific corporate  
349 policy for sustainability, some organizations attempted to make reference to the existing sustainable  
350 building assessment systems. Majority interviewees employ sustainable building assessment tools such as  
351 LEED and BEAM Plus as an instrument in guiding their sustainable movement. Interviewee R01 revealed  
352 that his organization adopts both local (BEAM Plus) and overseas (LEED) sustainable building assessment  
353 systems as a framework for sustainable practices. Similarly, interviewee I01 also held that sustainable  
354 building certifications help to make the task of planning and designing sustainable buildings easier. The  
355 result indicates that the sustainable building certifications serve as a very useful tool, particularly to  
356 stakeholders who lack subject knowledge in sustainable construction practice. This is aligned with Shan  
357 and Hwang (2018)’s findings that advocate sustainable building rating tools contribute to four benefits: 1)  
358 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

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537

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576

577

## TABLE

Table 1 The profile of interviewees

<b>No</b>	<b>Interviewee Code</b>	<b>Experience (years)</b>	<b>Position</b>
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