



International High- Performance Built Environment Conference – A Sustainable Built Environment Conference 2016 Series (SBE16), iHBE 2016

## An investigation of corporate approaches to sustainability in the construction industry

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### Abstract

Corporate sustainability demands the integration of environmental performance, social justice and economic efficiency and, into company's operational practices. Construction companies are increasingly under pressure to commit to and report on the overall sustainability performances of operational initiatives. The aim of this paper is to investigate the sustainability performance of the top 50 construction contractors listed by Engineering News Record (ENR) against the triple bottom line. Under this aim, the specific objectives are: (i) examine the approaches adopted by construction firms to disclose their commitments to sustainability; (ii) review the firms' annual and sustainability reports; and (iii) analyse the sustainability performance of construction firms against the GRI (Global Reporting Initiatives) guidelines. This study adopted survey design in which data were collected by reviewing publicly available organisational documents. Afterward, content analysis was conducted. The results indicate that financial performance is still the main target of most organisations. European contractors are considered best and Australasian contractors on the other side are considered as worst in reporting sustainability initiatives.

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Peer-review under responsibility of the organizing committee iHBE 2016.

*Keywords:* Sustainability performance; construction organisations

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## 1. Introduction

Construction industry contributes significantly to most economies in terms of GDP and employment. However, on the other side construction activities have several negative impacts on the society and planet itself these include: carbon emissions; pollution (noise; air; water quality); and waste generation [1]. There is an increased pressure on construction companies to broaden the accountability of companies beyond economic performance, for shareholders, to sustainability performance for all stakeholders [2]. Consequently sustainability has become an important agenda on the company's strategic decision making.

International institute for sustainable development(IISD, 1992) defined corporate sustainability as “*adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future*”[3]. Organisational sustainability performance has interested many researchers. Hahn and Scheermesser researched the approached among German companies, they used a cluster analysis to distinguish between three significantly distinct types of approach to corporate sustainability among the respondents: sustainability leaders, environmentalists and traditionalists [4]. Similarly Jones et al., researched sustainability practices of US engineering and construction firms [5]. However none of studies focused on the sustainability practices of construction companies against GRI guidelines.

This paper adopted a survey research design and aimed to examine sustainability practices of top 50 construction contractors listed by Engineering News Record (ENR). The objectives of this paper are: (i) examine the approaches adopted by construction firms to disclose their commitments to sustainability; (ii) review the firms' annual and sustainability reports; and (iii) analyse the sustainability performance of construction firms against the GRI (Global Reporting Initiatives) guidelines.

## 2. Organisational sustainability and sustainability performance

The words “sustainability” and “sustainable development” are often used interchangeably. The World Commission on Environment and Development defined sustainable development as “*meeting the needs of the present without compromising the ability of future generations to meet their own needs*” [5, p. 8]. Organisational sustainability extends the principles of sustainable development to the level of organisations. From this perspective, an organisation is considered sustainable if a certain level of performance is attained in all the three dimensions of sustainability (i.e. social, economic and environmental). Thus organisational sustainability is about finding the balance between the three main aspects of sustainability. International institute for sustainable development(IISD, 1992) interpreted corporate sustainability as “*adopting business strategies and activities that meet the needs of the enterprise and its stakeholders while protecting, sustaining, and enhancing the human and natural resources that will be needed in the future*”[6].

Dyllick and Hockerts defined organisational sustainability as “*meeting the needs of a firms' direct and indirect stake holders (such as shareholders, employees, client, pressure groups, communities) without compromising its ability to meet the needs of future stakeholders*”[7, p.131]. They highlighted that the departure of sustainability from orthodox management to the triple bottom line concept is the realization that economic success alone is not a sufficient condition for the overall long term sustainability of corporations. Similarly, Artiach et al. characterised corporate sustainability as a business and investment strategy that aims to use the best business practices to meet and balance the needs of current stakeholders [8]. These definitions are based on stakeholder theory (Freeman 1984), which is one of the most widely applied theoretical frameworks for research on corporate sustainability. Stakeholder theory suggests that corporations have obligations to individuals and groups both inside and outside of the corporation, including employees, customers, shareholders and the wider community [9].

The most important challenge in organisational sustainability field is to obtain a widely accepted and robust method to assess firms' sustainability performance. According to Montiel and Delgado-Ceballos there is an agreement on how to measure environmental dimension of organisational sustainability but there is a lack of clarity on how to measure the economic and social dimensions[10].

### 3. Sustainability reporting as way to measure performance

The World Business Council for Sustainable Development describes sustainability reporting as “*public reports by companies to provide internal and external stakeholders with a picture of corporate position and activities on economic, environmental and social dimensions*” [5, p. 7]. Zuo et al. explained that the essence of sustainability reporting is to disclose the company's commitments and achievements towards all aspects of sustainability, from perspectives of both internal and external stakeholders [11]. Vormedal and Rudd (2009) highlighted that the sustainability reporting practice is mainly driven by perceived benefits such as the long term success of the business due to improved communication between stakeholders [12]. Using a case study methodology Kolk claimed that sustainability reporting contributes to the future growth of the company by adding value from the perspective of various stakeholders [13]. Some benefits of sustainability reporting summarized by KPMG are: (i) demonstrating transparency ; (ii) Enhance reputation;(iii) improve regularity compliance; (iv) Establish competitive position and market differentiation; and (v) Attract long term capital and favorable financing conditions[14].

The most popular used reporting frameworks adopted by construction organisations are Global reporting initiative (GRI); Dow Jones sustainability Index and ISO 26000. Pérez-Batres et al. highlighted that GRI is a leading guideline for creating sustainability reports and for analysing firms' sustainability performance; thus helping companies to maintain their legitimacy as sustainable organisations [15]. It follows that this research used the GRI indicators to measure the sustainability performance of top 50 construction contractors as indicated in Table 1. The GRI reporting framework is comprised of four key elements: (1) principles and supervision on the report quality and contents; (2) procedures for performance indicators; (3) standard disclosures on company profile, management approach ; and (4) sector supplements, i.e. how the Guidelines should be in a specific sector[16]

Table 1. Sustainability performance indicators adopted by Global Reporting Initiative

Sustainability Dimension	Performance Indicators
Economic	financial performance Market presence Indirect economic impacts
Social	Labor practices and decent work Human rights Community
Environmental	Product responsibility Materials Energy Water Biodiversity Emissions and waste Products and service Compliance Transport

ISO 26000 published in November 2010 is the first ever ISO guidance standard on social responsibility, it emphasises the value of public reporting on social responsibility performance to internal and external stakeholders,

such as employees, local communities, investors and regulators. ISO 26000 provides guidance on the underlying principles of social responsibility, the core subjects and issues pertaining to social responsibility and on ways to integrate socially responsible behaviour into existing organizational strategies, systems, practices and processes. ISO 26000 also emphasises the importance of results and improvements in performance. These guidelines are aligned with GRI's vision that disclosure on economic, environmental, social and governance performance becomes as commonplace and comparable as financial reporting [17].

Established in 1999, the Dow Jones Sustainability Indexes evaluates the sustainability performance of largest 2500 companies listed on the Dow Jones stock market. DJSI is based on an analysis of corporate economic, environmental and social performance, assessing issues such as corporate governance, risk management, branding, climate change mitigation, supply chain standards and labor practices [18].

#### **4. Research methodology**

This research adopted a survey research design which involved a systematic review of the contents of annual reports and websites of the top fifty construction organisations as listed by Engineering News Record (ENR). Subsequently, contents analysis was done to examine the patterns and frequencies of words and text used in those organisational documents. According to Weber (1985) content analysis as a research method is a systematic and objective mean of analysing any written, verbal or visual communication messages. This method is extensively used in sustainability related research (e.g.: [19], [20], [21]) to survey published accounts. Krippendorff emphasized that the importance of content analysis is based on the assumption that the degree of disclosure can be taken as an indication of the importance of an issue to the reporting organisation [22].

For each organisation the annual report and any separate sustainability report for the year 2015 were collected and analysed to identify whether the organisations included social responsibility and environmental commitments in their annual reports. Likewise organisation's websites were also investigated for any information related to sustainability performance. Organisations' sustainability performance were analysed by the reporting of organisation's commitments towards all three dimensions of sustainability i.e. environment; society and economic. The data was collected via company websites in June 2016. Any sustainability reporting data released later is not considered in this study.

#### **5. Results and Findings**

Table 2 presents the summary of the sample characteristics. Top 6 of the companies are from china; this presents the current trend of infrastructure development in China. The sample of top 50 contractors has revenue of 111.75 billion altogether. The average revenue of the sample is 22350M. For the purpose of analysis the sample is divided into four groups based on the regions. Australasia is the biggest group comprises 30 companies; this includes companies from Australia, Korea, China and Japan. China is the dominating country (17 companies) in this group. It could be noted that these Chinese contractors worth revenue of \$559861 M which is almost half of the total revenue of the top 50 contractors. Europe is the second biggest group with revenue of 252738 M it comprises 11 companies including companies from Austria, France, Germany, Italy, Spain and Sweden. The third group is Americas (revenue: 131113M) which has 7 companies 6 of which are from USA and one from Brazil. Asia is the smallest group with revenue of 19950M it comprises one company from India and Turkey each.

Table 2. Top 50 international contractors

Rank	Firm	Country	Region	Revenue (M)	GRI indors ement	Web Disclosure	Annual Report	sustainabilit y report	ISO 2600 0	CSR
1	China Railway Group Ltd	China	Australasia	113105	0	0	0	0	0	0
2	China State Construction Eng'g Corp. Ltd	China	Australasia	110579	0	0	0	0	0	0
3	China Railway Construction Corp. Ltd	China	Australasia	97044	0	0	0	0	0	0
4	China Communications Construction Grp	China	Australasia	60314	0	0	0	0	0	0
7	Power Construction Corp. of China	China	Australasia	38689	0	1	0	0	0	0
10	China Metallurgical Group Corp	China	Australasia	30026	0	0	0	0	0	0
12	Shanghai Construction Group	China	Australasia	26621	0	0	0	0	0	0
13	CIMIC Group Ltd	Australia	Australasia	18898	1	1	1	1	0	1
17	Hyundai Engineering & Construction Co	Korea	Australasia	16366	0	1	1	1	0	0
18	Obayashi Corp	Japan	Australasia	14957	0	1	1	1	0	1
21	Samsung C&T Corp	Korea	Australasia	14092	1	1	0	0	0	1
24	Kajima Corp	Japan	Australasia	12529	0	1	1	1	0	1
25	Shimizu Corp	Japan	Australasia	11992	0	1	1	1	0	1
26	Taisei Corp	Japan	Australasia	11688	0	1	1	1	1	1
29	China National Chemical Engineering Group Corp	China	Australasia	10770	0	0	0	0	0	0
33	China Gezhouba Group Co	China	Australasia	9614	0	0	0	0	0	0
34	Zhejiang Construction Investment Grp	China	Australasia	9417	0	0	0	0	0	0
35	Lend Lease	Australia	Australasia	9282	1	1	1	0	0	0
36	Daewoo Engineering & Construction Co	Korea	Australasia	8962	0	1	1	1	0	0
37	Takenaka Corp	Japan	Australasia	8652	0	1	1	0	1	1
38	GS Engineering & Construction	Korea	Australasia	8450	0	1	1	1	0	0
39	POSCO Engineering & Construction	Korea	Australasia	8083	1	1	1	1	0	0

40	Sinopec Engineering (Group) Co	China	Australasia	8064	0	1	1	0	0	0
41	Beijing Urban Construction Group Co	China	Australasia	7885	0	1	0	0	0	0
42	Anhui Construction Engineering Group Co. Ltd	China	Australasia	7788	0	0	0	0	0	0
43	Qingjian Group Co. Ltd	China	Australasia	7744	0	0	0	0	0	0
44	Beijing Construction Engineering Group Co. Ltd.	China	Australasia	7550	0	0	0	0	0	0
45	China Yunnan Construction Engineering Group Co. Ltd.	China	Australasia	7486	0	0	0	0	0	0
46	SK Engineering & Construction	Korea	Australasia	7379	0	1	0	0	0	1
15	Jiangsu Nantong No.3 Construction Group Co. Ltd.	China	Australasia	9672	0	1	1	0	0	0
<b>Total</b>			<b>30</b>	<b>7,13,698</b>	<b>2</b>	<b>9</b>	<b>7</b>	<b>3</b>	<b>1</b>	<b>2</b>
<b>Percentage</b>			<b>60%</b>	<b>63%</b>	<b>6%</b>	<b>30%</b>	<b>23%</b>	<b>10%</b>	<b>3%</b>	<b>6%</b>
47	Fluor Corp	USA	America	7165	0	0	0	0	0	0
48	PCL Construction Enterprises Inc	USA	America	7232	0	1	0	0	0	0
5	Bechtel	USA	America	10165	0	0	0	0	0	0
6	Construtora Norberto Odebrecht	Brazil	America	31118	1	1	1	1	0	1
30	CB&I	USA	America	7095	1	1	1	1	0	1
31	Kiewit Corp	USA	America	51868	1	1	1	0	1	0
49	AECOM	USA	America	16470	0	1	1	1	0	0
<b>Total</b>			<b>7</b>	<b>1,31,113</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>2</b>
<b>Percentage</b>			<b>14%</b>	<b>12%</b>	<b>43%</b>	<b>71%</b>	<b>57%</b>	<b>43%</b>	<b>14%</b>	<b>28%</b>
28	Larsen & Toubro Ltd	India	Asia	12929	1	1	1	1	0	0
50	Ozturk Holding Co	Turkey	Asia	7021	0	0	0	0	0	0
<b>Total</b>			<b>2</b>	<b>19,950</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Percentage</b>			<b>4%</b>	<b>2%</b>	<b>50%</b>	<b>50%</b>	<b>50%</b>	<b>50%</b>	<b>0</b>	<b>0</b>
8	VINCI	France	Europe	32335	1	1	1	0	0	1
9	ACS	Spain	Europe	17687	0	1	1	1	0	0
11	BOUYGUES SA	France	Europe	13831	1	1	1	1	0	0
14	HOCHTIEF	Germany	Europe	11429	1	1	1	1	0	1
16	Skanska	Sweden	Europe	28302	1	1	1	1	0	0
19	STRABAG	Austria	Europe	14437	0	0	0	0	0	0

20	EIFFAGE	France	Europe	14343	1	1	1	1	0	1
22	TECHNIP	France	Europe	11618	1	1	1	1	0	1
23	Saipem	Italy	Europe	16924	1	1	1	1	1	0
27	Ferrovial	Spain	Europe	45751	0	1	1	0	0	1
32	Royal BAM Group	Netherlands	Europe	46081	0	1	1	1	0	1
<b>Total</b>			<b>11</b>	<b>2,52,738</b>	<b>7</b>	<b>10</b>	<b>10</b>	<b>8</b>	<b>1</b>	<b>6</b>
<b>Percentage</b>			<b>22%</b>	<b>23%</b>	<b>63%</b>	<b>90%</b>	<b>90%</b>	<b>72%</b>	<b>9%</b>	<b>54%</b>

\* 0 indicates no and 1 indicates yes

### 5.1 Online disclosure

The trends of the population sample in terms of public availability of annual and sustainability reports can be found in table 2. This information could be located under tabs such as sustainability, sustainable development and corporate social responsibility on companies' website. These policies however vary in terms of level of details from company to company. For example European contractors have indicated detailed information related to sustainability policy. On the other side the top Four Chinese contractors has not shown any sustainability commitments on companies' website at all. Most web pages covered the following content:

- Company's mission statement.
- Methodologies to accomplish sustainability in different projects, e.g. environmental friendly construction techniques, social activities.
- Management systems used to accomplish different aspects of sustainability, e.g. ISO 26000 certification.
- Procedures associated to sustainability, e.g. targets set by the company to reduce greenhouse emissions.

### 5.2 Sustainability Reporting

As shown in table 2, amongst European contractors 72% of the companies published separate sustainability report. It is followed by Asia: 50% and America: 43%. It should be noted that only ten percent of Australasian companies document their sustainability commitments in standalone sustainability report. While 23% percent of the sample companies published annual reports in this group it is interesting to note that only 5% of those companies included sustainability related commitments into their annual reports. This trend of reporting financial outcomes is predominantly found in the Chinese contractors. Japanese contractors used CSR based sustainability management models; these contractors are amongst the best to report their sustainability performance in Australasian group. Korean and Australian companies used GRI guide lines; they also published detailed sustainability reports.

### 5.3 Sustainability performance against GRI guideline

The companies' performance with the GRI was recorded, following the technique of [23], using a system of "0" representing non-compliance and "1" meaning compliance. The investigation of Sustainability Disclosure Database of the Global Reporting Initiatives showed that; European companies have the highest percentage (63%) of GRI endorsement followed by Asian (50%) and American (43%) contractors. The Australasian contractors are at the bottom of the table with only 6% of GRI endorsements.

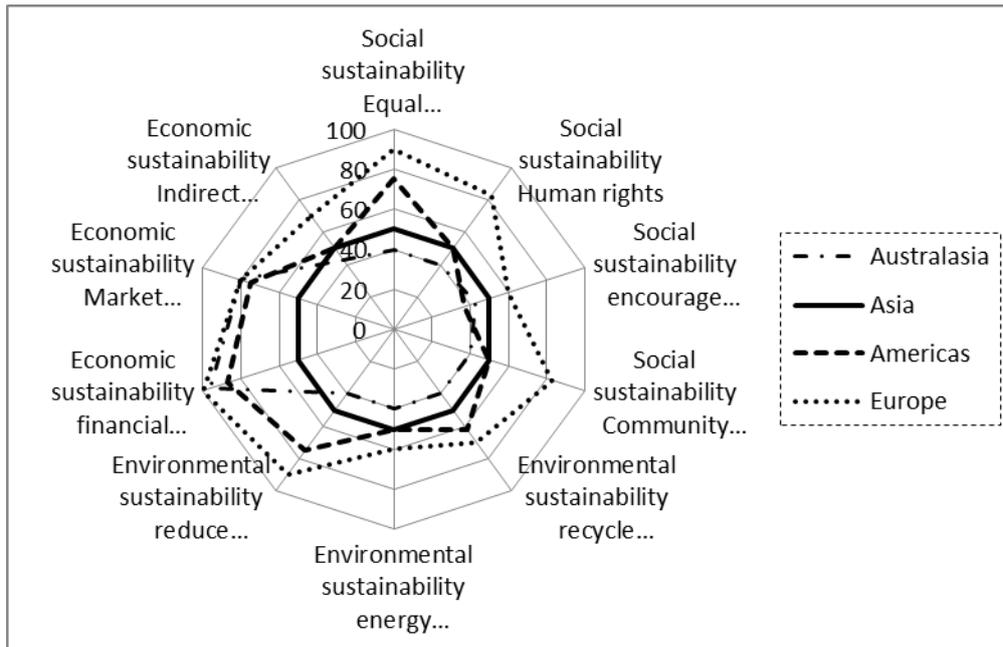


Fig.1: Sustainability performance of top 50 global contractors

Further attempts were undertaken to examine companies' sustainability initiative according to their geographical regions. For the purpose of further analysis the sample is divided into four groups based on the regions. From Figure 1, it is notable that the majority of the companies have placed strong emphasis on the financial aspect of sustainability. Also, our result reveals that Europeans contractors are far better towards adopting sustainability practices than the counterparts from other regions, and that this group of contractors has seen to be motivated by ethical and moral factors. One of the most distinguishing characteristic of this group is that these contractors have integrated all three dimensions of sustainability into their business operation. These include: a) publication of detailed sustainability reports; b) performance measurement against set targets for waste minimisation; c) high standards towards employee safety and training. Also, we found that American contractors have placed significantly high emphasis on sustainability, and included sustainability commitments and performance in their annual reports. These commitments are mostly related to: a) workplace safety and diversity; b) greenhouse gas emissions; c) community fund raising.

The sustainability commitments of group three and four are almost similar. They have included sustainability initiatives however; their reports are not as detailed as the contractors from European region. Australasia is the biggest by number (30), but the combined sustainability commitments of this group are very low. It should be noted that this group included seventeen Chinese companies; which only indicated their financial performance. Otherwise Australian, Japanese and Korean companies exhibited an extraordinary involvement of all three areas of sustainability into their business operation.

## 6. Conclusion

This paper adopted a survey research design in which content analysis is done to examine the sustainability practices implemented by top 50 construction contractors listed by the Engineering News Record. The results demonstrate that while there is an increase in the publication of sustainability reports nevertheless the quality of reports vary in each region. This indicates that companies are increasingly recognising the importance of disclosure of the corporation's commitments and achievements on sustainability. The sample was divided into four groups

based on regions as: Australasia, America, Europe and Asia. It was interesting to know that Australasia is the biggest group nevertheless this group appeared to be worst in reporting sustainability initiative; this low performance is mainly seen in Chinese companies. European contractors are far better towards adopting sustainability practices than the counterparts from other regions. Contractors in America and Asia showed moderate trends. It appears that GRI is used mostly by the European contractors to report their sustainability performance.

This study could be used as a useful starting point by both policy makers and industry specialists to further improve sustainability performance of the construction industry. However should be recognized that this study is only based on openly available information on companies' website and annual reports thus it might not represent the real practice. Other limitation of this study lies in the use of only one year of sustainability reports and use of limited indicators in the analysis thus the results could not be definitive but suggestive of an apparent trend. There are several possibilities for further research in this area. For example, future research could go beyond content analysis; practices of organisations could be studied using questionnaire survey or interviews.

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