

Impact of sustainability on business performance and strategy for commercial building contractors

Sustainability
on business
performance

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Abstract

Purpose – The purpose of this paper is to understand the corporate sustainability culture of contracting firms, particularly in the Midwest. Many of the local firms operate nationally. The local corporate culture influences their regional offices. Other than convenience, the firms are selected from Midwest since their headquarters are situated in Midwest region and comprises of more number of employees than their other regional offices. This helped the research to approach more contractors for better survey and interview responses. The paper documents the study on existing management and construction practices these contractors adopt on sustainability and examines how their sustainability efforts influence the firms' performances.

Design/methodology/approach – This research utilized surveys and interviews as the primary means of data collection. The data were collected from survey and interviews with selected companies operating in the Midwest region of the USA. One of the companies also operates offices across the country. Data from the interviews and surveys were analyzed using statistical analysis system software application. χ^2 analysis, particularly the frequency procedures using the Cochran-Mantel-Haenszel (CMH) method was the primary analysis method used to study the relationships between different factors. The CMH method compares the association between and within two groups and permits adjustments of the control variables.

Findings – The findings of this paper include the results from various Midwest commercial building contractors. The results on different aspects of sustainable practices and their success rates among the contractors are determined and discussed, and future scope of improvements are mentioned at the conclusion of this paper.

Research limitations/implications – In summary, sustainable business practices are beneficial to society and favorable for the construction business. Embracing sustainable business practices has a positive impact on firm strategic performance for commercial building contractors through employee satisfaction, project opportunities, and market advantage. Sustainable business practices extend into



the lives of individuals involved which exceedingly impacts society. The construction industry has advanced sustainability efforts, but there is a long way to go on the journey to being better stewards of the environment and resources.

Originality/value – A rival theory became apparent during the investigation that a new building consolidating all local company employees could have an impact on firm strategic performance. Third, this paper is confounded by a great recession that made project opportunities and revenue considerations analysis problematic. Some information regarding these aspects were helpful; however, expanding this paper during a more stable and typical economic period could provide additional insight.

Keywords Sustainable practices, Construction industry, Commercial building contractors, Survey questionnaires

Paper type Research paper

1. Introduction

Modern society depends heavily on the built environment. It is our means to move around, live and work as modern humans spend most of our time in this environment (homes, offices, road, groceries stores, etc.). This built environment leaves a significant footprint on the globe, and our growing economy and population swell the footprint exponentially. Reusing, recycling, renewable materials, and green building design are some of the core areas that would reduce such footprints (Halliday, 2008). The efficiency of systems and buildings, carbon emissions, hazardous materials, and microclimate (Glavinich, 2008; Saparauskas, 2003) are the other factors driving sustainability of the industry. There are plenty of sustainability solutions offered to the industry, as the Leadership in Energy and Environmental Design (LEED) guidelines, International Green Construction Code, and ASTM sustainable standards. However, the success of sustainability lies in the culture of companies and communities (Eccles *et al.*, 2011; Gupta and Kumar, 2013; Linnenluecke and Griffiths, 2010; Schensul, 2009).

2. Research objectives

The focus of this paper is to understand the corporate sustainability culture of contracting firms, particularly in the Midwest. Many of the local firms operate nationally. The local corporate culture influences their regional offices. Other than convenience, the firms are selected from Midwest since their headquarters are situated in Midwest region and comprises of more number of employees than their other regional offices. This helped the research to approach more contractors for better survey and interview responses. The paper documents the study on existing management and construction practices these contractors adopt on sustainability and examines how their sustainability efforts influence the firms' performances.

The paper addresses three sub-objectives that are grouped into three performance parameters: employees' satisfaction, project opportunities, and market advantage. These three parameters are quintessential drivers that attract companies to adopt sustainability practices as confirmed by prior research (Avlonitis and Gounaris, 1997; Chi and Gursoy, 2009; Eccles *et al.*, 2011; Gupta and Kumar, 2013; Linnenluecke and Griffiths, 2010; Matzler *et al.*, 2004; Mochama, 2013; Saari and Judge, 2004). These parameters are essential for companies to enhance their competitiveness, and the main reasons why these companies focusses on sustainability. Figure 1 shows the research questions and measurement for this research study.

The first objective examines the relationships between corporate sustainable business practices and employees' satisfaction. This objective examines the effects of different sustainable business practices on different employees' satisfaction parameters. These

parameters emphasize on work productivity, capacity, and collaboration between workers. The hypothesis assumes that sustainable business practices increase both productivity and satisfaction among employees. The second, examines the effects of sustainable business practices on business opportunities. The hypothesis assumes that sustainable strategies increase project opportunities. This objective assumes that sustainable strategies open new doors to sustainable projects (from environmentally cautious clients). Such opportunities are measured by the perception of interviewees relating to attracting clients, retaining clients, and community involvement. The third examines how sustainable business practices influence corporate's business advantages. The hypothesis assumes that increasing sustainable business practices lead to increasing business advantages. Such practices increase business efficiency and lower operation costs. The market advantage is measured by analyzing project execution, culture, and other competitive advantages.

3. Sustainability and business performance

While sustainability is crucial to our society, for-profit businesses have to have justifiable reasons to integrate sustainability into their businesses. This section discusses company's advantage of implementing sustainability, and the key elements of sustainability.

3.1 Life cycle analysis (LCA) and holistic sustainability

LCA is an essential sustainability tool that models project and product lifecycle holistically (Bogenstatter, 2000). Sustainability models have to be holistic as missing variables would deflect the purpose of sustainability. Sustainability implementation should be holistic rather than discrete. Shireman and Kiuchi stressed the importance of creating value webs of interconnected factors rather than value chains that focus only on one or few factors and interconnections.

3.2 Sustainability and LCA can be used to understand the market

Many companies use LCA to model the environmental impact of their enterprise. LCA can be used to understand the impacts of marketing (Cerin and Laestadius, 2003). Braithwaite's case paper on Kingspan Insulation showed how sustainability assessment and subsequent reassessments improved the company's market advantage through community relations and operational savings.

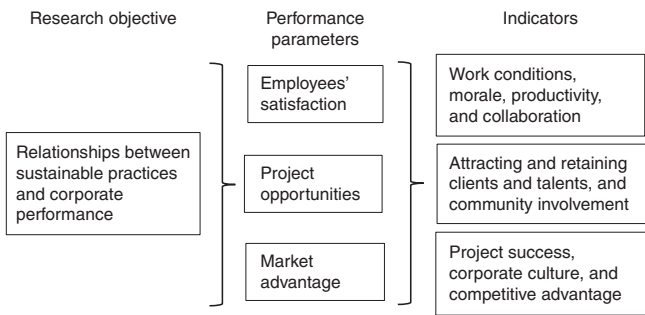


Figure 1.
Research questions
and measurement

3.3 Corporate social responsibility (CSR)

Social needs are critical elements of business practices. Modern businesses have to address the needs of community and society, particularly development. Bansal and Roth (2000) studied 53 companies in the UK, and Japan demonstrated the significance of the human dimension of sustainability (Bansal and Roth, 2000). This corporate environmental responsibility included national government policies, market forces, community groups, and NGOS. Also, companies often utilized a social value-added tool that provided a snapshot of business CSR. Such tool was prone to the halo effect where responses may be influenced by biases and perceptions. In the USA, programs such as the Resource Conservation and Recovery Act in 1976, Environmental Protection Agency's Energy Star, Department of Energy Federal Energy Management Program, Environmental Preferable Purchasing program, and Biobased Products program contributed to such sustainability efforts. Greening the Government Through Leadership in Environmental Management Executive Order 13,148 in 2000 also aimed to make the country more sustainable (Bergeson, 2002). Pimentel *et al.* (2004) recommended removing energy industry subsidies to motivate consumer energy conservation.

3.4 Sustainability audit

Woodall *et al.* (2004) illustrated a measurement tool to quantify sustainable business practices in companies with six main categories including communication and auditing. The Corporate Sustainability Commitment Index considered the three primary areas of sustainability in a corporation – strategic planning, sustainability and investor relations, and the frequency of sustainability is benchmarking. Innovation and reputation helped firms differentiate from their competitors and created value for the firm (Rodriguez *et al.*, 2002). When sustainable business practices were a principal business strategy, it influenced business processes and was apparent to stakeholders (Leiper *et al.*, 2003).

4. Sustainability in construction

Sustainability in the construction industry lagged behind other industries even though the industry consumed most of the resources in the USA. The diverse organization structure and professionals involved separated the processes and thus made sustainability in construction difficult to be fully holistic (Hill and Bowen, 1997). The construction industry consumed more materials by weight than any other industry in the USA (Horvath, 2004). Peng *et al.* (1997) noted that sustainable practices (e.g. material recycling) were extremely expensive to implement. A study in Brazil indicated that improving initial efforts in the design and procurement phases was economical in reducing construction waste. The study also suggested improving control efforts in the construction process to help reduce construction waste.

There are many sustainability tools to evaluate sustainability in construction. Bilec *et al.* (2006) used a hybrid life-cycle assessment to evaluate the sustainability of construction process of a precast parking structure. Also, they found that transportation, equipment, and support functions in the construction process had the largest negative effects on the environment. Hill and Bowen's (1997) proposed environmental management system tool be used to evaluate the sustainability of construction projects. Bossink (2004) found that sustainability innovation in

construction can be divided into technological capability, environmental pressure, knowledge exchange, and boundary spanning.

The paper aims at addressing the specific gaps that causes hindrance to the contracting firms to adopt sustainability practices. While there are lots of tools and practices adopted, the statistical results of the impact of sustainable practices with respect to employee satisfaction, business opportunities, and business advantages needs to be documented and evaluated by the firms to understand their opportunities. This can help them to achieve their target, elevate productivity and improve job satisfaction of the employees in their firms. High cost and employees' commitment hindered sustainability implementation in companies. It is especially difficult for contracting firms to adopt sustainability due to the diverse nature and uniqueness of the industry and projects. The current paper aims to contribute to the existing body of knowledge on corporate social sustainability impacts on contractor performance by evaluating how sustainable practices influence their bottom line.

5. Research methods

This research utilized surveys and interviews as the primary means of data collection. The data were collected from survey and interviews with selected companies operating in the Midwest region of the USA. One of the companies also operates offices across the country.

5.1 Survey data collection process

A survey form was developed to collect data on sustainability practices among contracting firms. The first round of the survey was sent to specialty contractors and the second round to the general building contractors. The survey contained closed and open-ended questions that focus on both quantitative and qualitative data and information. The specialty contractors were selected from those in the business of providing and installing mechanical, plumbing, fire suppression, or electrical systems in commercial buildings. The general building contractors were all national and international level contractors. Some of the questions were slightly modified for both grounds of contractors to reflect the differences in the business nature and operation structure.

5.2 Interview data collection process

Interviews were conducted with a 99 interviewees from three regional companies, namely, JE Dunn, Tarlton, and AL Huber. The interviews focussed on the sustainable business operation, corporate performances, project performances, and employees' satisfaction. Sustainability has been extensively applied and integrated into these companies' business processes and procedures. However, they took very different approaches. The questions were designed to extract the differences between these companies.

5.3 Data analysis

Data from the interviews and surveys were analyzed using statistical analysis system software application. χ^2 analysis, particularly the frequency procedures using the Cochran-Mantel-Haenszel (CMH) method was the primary analysis method used to study the relationships between different factors. The CMH method compares the association between and within two groups and permits adjustments of the control variables.

6. Survey responses

The survey responses from the specialty contractor and general contractor were combined for the statistical analysis. In all, 45 valid survey responses were received (28 from specialty contractors and 17 from general contractors).

It represents a 20 percent response rate out of the 220 sent requests. The data were analyzed using the χ^2 tests to determine the data best fit. The data's averages, percentages, and ranges were also examined and used in the analyses. Table I outlines key survey questions and the areas of emphasis. The survey was divided into five emphases, namely, demographics, corporate messaging, and current conditions of the company, current sustainable efforts, and future expectations.

7. Survey results

Figure 2 shows the types of contractors that responded to the survey. Respondents in the other category (24 percent) included contractors for low voltage electrical works,

Emphasis	Key survey questions
Demographics	What is your primary area of business? Which range best describes your company's annual revenue? Is your company union, non-union or both?
Company messaging	Select the following parameters that are included in your company's mission statement Select the following parameters that are included in your company's strategic plan Select the following parameters that are included in your company's operational or business plan
Current conditions	Your company has worked on how many LEED projects? Approximately what percentages of your projects in 2009 are LEED certified? Approximately what percentages of your projects are competitively bid? How does your company plan projects? Select the items your company incorporates into project planning
Current sustainable business practices	Rate the following items as they pertain to your company Select the following actions that have been implemented in your office Select the practices your company regularly incorporates How does your company consider environmental impacts in business decisions? How does your company invest in improving productivity?
Future expectations	Rate the following LEED items as they pertain to your company Select the items your company is considering changing What is your primary concern for the future of your company?

Table I.
Key questions
of the survey

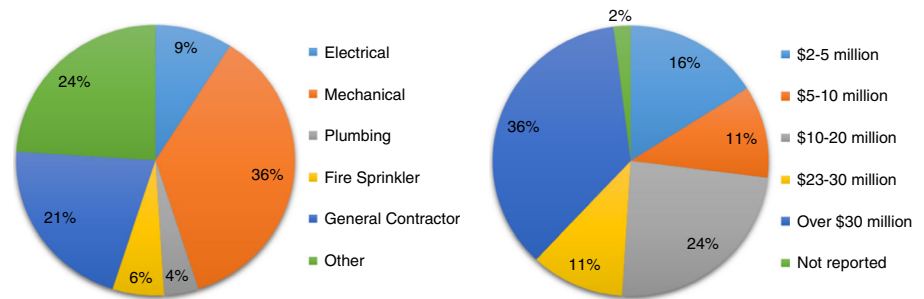


Figure 2.
Types of contractors
and annual revenue

structural steel installation, roofing, concrete and asphalt installations, and/or Department of Defense work. As illustrated in Figure 2, annual revenue for the companies ranged from two million to over \$30 million. Specifically, seven respondents stated that the annual revenue of their company was \$2-5 million, five reported \$5-10 million, nine reported \$10-20 million, five reported \$20-30 million, and 15 reported over \$30 million of annual revenue.

The number of LEED projects reported ranged from zero to 100 projects with an average of almost 13 projects. Figure 3 shows 89 percent of respondents' companies are involved with LEED projects. Only 11 percent did not report having LEED projects within the past year.

Figure 3 shows the total composition of LEED certified projects versus non-LEED certified projects the respondents' companies were involved. In all, 60 percent of the respondents' companies had 30 percent or less of all their projects LEED certified, and 18 percent over 40 percent LEED certified. Around 15 percent did not have any LEED certified projects. The survey showed that majority of the companies have experience on LEED certified projects. In all, 80 percent of the respondents highlighted that their company tracked proposal and bid success rates. Slightly over half of the projects were procured through competitive bids by these companies as indicated in Figure 4.

In all, 14 participants did not respond to questions about how their company approached environmental impacts on their business decisions. Further inquiries found that these respondents did not have sufficient knowledge on the subject and thus avoided the questions. Profit was the top concern among these companies. The three top concerns appeared to be intimately tied to profits. The responses also suggested that any advantage for improving backlog and opportunities for projects would be

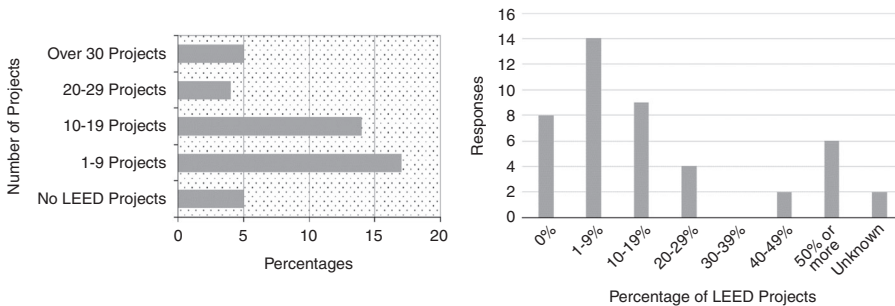


Figure 3.
Quantity and
percentage of
LEED projects

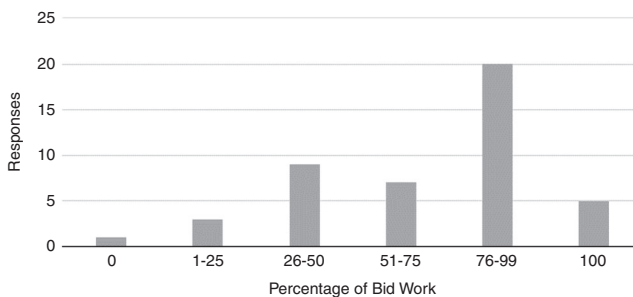


Figure 4.
Percentage
of competitively
bid work

better received than those not tied to such opportunities. These responses substantiated that sustainability was a secondary concern among the contractors unless it was viewed as an end to achieve their profit goals.

In all, 14 respondents did not respond to the questions in productivity improvement. The survey showed that technology (seven respondents), equipment (seven), training (six), pre-planning (five), tracking progress (four), and pre-fabrication (one) were the driving forces behind productivity improvement. The responses suggested that productivity was a focus of many contractors as it impacts financial success. It indicated the majority of contractors would consider changing their business operation that would improve productivity.

7.1 Comparison of sustainable practices among different company types

A generalized CMH test for the conditional dependence was used to detect the association between factors. Table II summarizes 13 sustainable business practices in the survey related to the office environment. No association between the type of company and office sustainable business practices were observed.

The values in Table II were determined by the χ^2 analyzed to test for associations. For example, variable 19a had a *p*-value of 0.2812. This *p*-value was greater than 0.05, and this demonstrated no statistical significance between the type of companies and the sustainable business practice of adjusting HVAC settings during non-occupied hours. Each type of company represented in the surveys was at a similar stage of integrating sustainability into their business practices. The tests did not exhibit any association on the operational sustainability efforts (Table III). The null hypothesis assumed that the type of business will not have an effect company's sustainability efforts.

7.2 Company leadership and vision

Corporate messages included what sustainability components the company emphasized in their mission statements, strategic plan, and operations plan. No notable variation for the type of construction companies was detected for corporate messaging regarding sustainability, environmental responsibility, and social responsibility. Table IV summarizes the associations between the sustainable messages. The relationships between the different corporate messages revealed

Table II.
Office sustainable
efforts controlling for
type of company

Variable	Office sustainable efforts	<i>p</i> -value
19a	HVAC adjusted during unoccupied times	0.2812
19b	Automated mechanical controls	0.3502
19c	Energy efficient HVAC	0.2510
19d	Energy efficient appliances	0.6889
19e	Building insulation improvements	0.6346
20a	Energy efficient lighting	0.7943
20b	Automated lighting controls	0.7590
20c	Daylight controls	0.8865
20d	Efficient water fixtures	0.7893
21a	Recycling	0.0731
21b	Purchasing recycled materials	0.2930
21c	Composting	na
21d	Carpooling	0.7518

Variable	Operations sustainable efforts	<i>p</i> -value	Sustainability on business performance
24	Plans ahead to minimize deliveries	0.9094	<div>331</div>
25	Maintains an inventory of frequently used materials	0.9572	
26	Seeks out “green” projects	0.8893	
27	Sustainability is considered in business decisions	0.5574	
28	Recycles in the office	0.4289	
29	Tracks proposal/bid success rates	0.5111	
30	Searching for opportunities in sustainable markets	0.9907	
31	Employees propose alternative methods for executing project tasks	0.9434	
32	Management is actively involved in evaluating installation methods	0.1832	
33	Company recycles or reuses demolition and scrap material	0.6239	
34	Company has a quality plan	0.1478	
35	Company has incentives for employee innovations	0.2070	
36	Company has an indoor air quality plan for projects	0.2558	
37	Qualified to participate in LEED projects	0.0486	
38	Willing to participate in LEED projects	0.3172	
39	Provided voluntary alternates for LEED credits	0.5515	
40	Encourages employees to seek LEED accreditation	0.4110	
41	Provides training about LEED and/or sustainability	0.4877	
42	Considers LEED a passing trend	0.2450	
43	Consider LEED as the best way to measure sustainability	0.8554	
44	Anticipates more stringent sustainability regulations	0.8491	

Table III.
Operations sustainable efforts controlling for type of company

Dependent	Responsibilities	Independent	<i>p</i> -value	
Mission statement	Sustainability	Strategic plan	0.0076	<div>Table IV.</div> Consistency in corporate messaging
Mission statement	Sustainability	Operations plan	0.0001	
Strategic plan	Sustainability	Operations plan	0.0002	
Mission statement	Environmental	Strategic plan	0.1109	
Mission statement	Environmental	Operations plan	0.0001	
Strategic plan	Environmental	Operations plan	0.1332	
Mission statement	Social	Strategic plan	0.0044	
Mission statement	Social	Operations plan	0.0001	
Strategic plan	Social	Operations plan	0.0005	

consistency regarding sustainability and social responsibility messages. Association tests indicated some inconsistency among environmental responsibility messages. Since the only positive correlations were detected, the variables appeared to be moving in tandem and not opposite each other.

As indicate in Table IV, seven associations had *p*-values less than 0.05. These *p*-values indicated consistency between corporate messages. Overall, messages on sustainability and social responsibility was relatively consistent among the contractors.

7.3 Sustainability in the construction industry

Additional review of the aggregate survey data were necessary to understand present conditions of the construction industry concerning sustainability. Several quantitative considerations were included in the survey data from this section onward. The following considerations are independent of the company types.

7.4 Existing conditions

The companies averaged 13 LEED projects. While these numbers seem small, only 11 percent of the respondents reported that they never worked on a LEED project. Table V illustrates the response rates for existing office conditions related to sustainable business practices. In all, 84 percent practiced recycling in their office. In all, 68 percent stated that HVAC interventions were conducted at their office during unoccupied times. In all, 51 percent stated that they have automated mechanical controls at their office, and nearly half (47 percent) had energy efficient lighting installed in their office.

Table VI illustrates planning efforts at the surveyed companies. In all, 80 percent of the respondents tracked proposal/bid success rates. To improve project success rates, 84 percent applied sustainable projects, and 80 percent searched for opportunities within the sustainable markets. In all, 87 percent stated that sustainability was considered as business decisions.

Table V.
Office existing
conditions

Sustainable business practice	Response rate (%)
HVAC adjustments during unoccupied times	67
Automated mechanical controls	51
Energy efficient HVAC	29
Energy efficient appliances	22
Building insulation improvements	16
Energy efficient lighting	47
Automated lighting controls	29
Daylight controls	11
Efficient water fixtures	24
Purchasing recycled materials	42
Composting	2
Carpooling	22
Recycles in the office	84

Table VI.
Planning efforts

Sustainable business practice	Response rate (%)
Pre-construction planning meetings	82
Project handoff meetings	78
Progress planning meetings	78
Post-construction review meetings	67
Plans ahead to minimize deliveries	80
Maintains an inventory of frequently used materials	82
Seeks out "green" projects	84
Sustainability is considered in business decisions	87
Tracks proposal/bid success rates	80
Searching for opportunities in sustainable markets	80
Your employees propose alternative methods for executing project tasks	76
Your management is actively involved in evaluating installation methods	78
Your company recycles or reuses demolition and scrap material	78
Your company has a quality plan	80
Your company has incentives for employee innovations	78
Your company has an indoor air quality plan for projects	80

These were positive results indicating active efforts to incorporate sustainability into their businesses. However, actions did not speak louder than words as only 42 percent used recycled materials, 22 percent carpooled regularly, and 2 percent used composted materials. The majority of companies did not include sustainability, environmental responsibility, and social responsibility into their corporate mission statement. Less than 50 percent of the responses (ranging from 16 to 47 percent) indicated that their company included sustainability, environmental responsibility, and social responsibility in their mission statement. Positive responses ranged from 31 to 42 percent for mission statements, 16 to 33 percent for strategic planning, and 44 to 53 percent for operational business plans. The exception was that 53 percent reported that their operational or business plan included sustainability. Findings indicated sustainability, environmental responsibility, and social responsibility were not primary factors in the current company messaging. Survey data revealed mixed messages of action and interest with regards to sustainability. If sustainability efforts improve productivity, project opportunities, or market advantage, more contractors may be eager to embrace new sustainability efforts and focus.

7.5 Summary of the survey results

The different types of contractors did not have notable differences in office sustainable business practices, operations sustainability efforts, or corporate messaging. The survey results found most respondents were involved in LEED projects, qualified and willing to be involved with LEED projects, provided voluntary alternates to support LEED efforts, and encouraged LEED training and accreditation among their employees.

The surveys are evident that sustainability has not been fully embraced in the construction field. It appeared that sustainability was not a key value among these companies, and sustainable efforts were only limited to project requirements. As expected, the surveys indicated that the construction industry has substantial room for improvement in sustainability.

7.6 Interview responses

The three contractors were of different sizes to provide variance. While each company provided construction management services, they also self-performed portions of construction projects. There was a wide range of individuals, who took part in the interview process, including numerous departments, positions, backgrounds, and company tenure. Each interview was approximately 15 minutes, and all interviews followed the same script that asked questions in sequential order. Questions were restricted to protect proprietary company information such as profit information and confidential clients. The interview questions pursued various information about the company current conditions regarding sustainability. In addition to determining current conditions, questions searched for direct or indirect impacts on sustainability efforts. Questions were designed to determine if sustainability efforts affected the company, employees, and/or clients. Questions determined changes in employee behaviors, employee satisfaction, and company culture. Questions also looked at market advantages impacted by sustainability efforts. Interviewees were allowed to discuss, comment, and expand upon questions. They were also given free reign at the end of the interview to offer additional thoughts. Table VII summarizes the interviews associated with each contractor.

Table VIII illustrates the types of responses from the interviews. Positive-leading questions were worded to try to obtain advantageous aspects.

As observed in Table VIII, 96 percent of responses were positive or neutral with only 14 percent of negative responses. In all, 85 interviewees were consistently optimistic about their new sustainable environment and the efforts their company was making to embrace sustainability. Employees expressed strong positive responses regarding their company, work conditions, and their sustainable progress.

7.7 Employee satisfaction analysis

The interviewees were asked their opinions of their individual workspace, the building's common areas, and meeting rooms. Table IX summarizes some important attributes of the work conditions.

Figure 5 shows favorite aspects of individual workspaces included natural lighting and openness of space. Responses varied because of variability in individual workspaces. In all, 75 percent were satisfied with their workspace, and 24 percent were neutral and did not have specific comments.

Interviewees were asked to provide feedback on their favorite aspects of the common areas. As shown in Figure 5, 30 percent liked or loved the common areas in their entirety. In all, 17 percent liked the openness of the environment, 9 percent liked the natural lighting, and 15 percent noted other positive aspects of the common areas.

Table VII.
Summary of
interviews conducted

Company	Number of interviews	Employees based on location	%
JE Dunn	62	330	19
Tarlton	28	35	80
A.L. Huber	9	13	69
Aggregate	99	378	26

Table VIII.
Type of interview
responses

Type of question	Positive responses (%)	Neutral responses (%)	Negative responses (%)
Positive-leading questions	74	22	4
Neutral questions	66	27	8
Negative-leading questions	38	19	42
Aggregate	61	25	14

Table IX.
Work conditions

Work conditions	Satisfied (%)	Not satisfied (%)	Unsure (%)
Individual workspaces	81	2	17
Common areas	85	1	14
Meeting rooms	94	0	6
Individual work	73	6	21
Collaboration	85	5	10
Learning/skill development	64	2	34
Social/interactive	90	4	6
Daylighting	83	11	6
Indoor air quality	83	8	9

In all, 29 percent did not have particular comments. Satisfaction with the common areas contributed to enjoyable work conditions. Figure 6 illustrates 69 percent respond they liked or loved the meeting rooms in their entirety. In all, 17 percent were impressed by the technology available at meeting rooms, and 10 percent were impressed with the overall design.

7.8 Visual and acoustical considerations

The sustainable design of each of the contractors' headquarters included an open office concept for the majority of employees. Overall, 72 percent indicated the new environment helped with individual efforts. The majority of employees were satisfied with the open office condition when it related to visual privacy levels. Figure 7 shows 76 percent were satisfied with the visual privacy levels, 24 percent did not like the

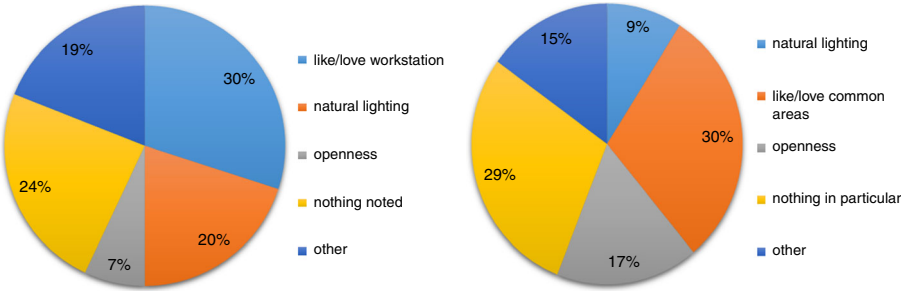


Figure 5.
Comments about
workspaces and
common areas

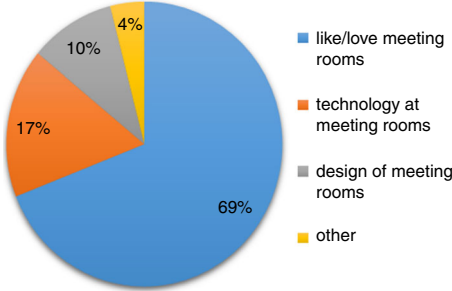


Figure 6.
Comments about
meeting rooms

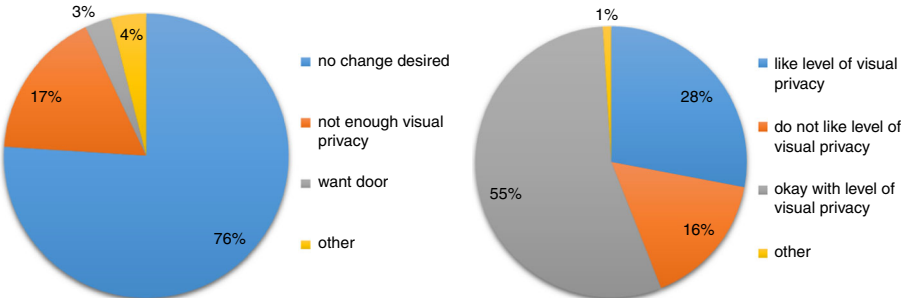


Figure 7.
Visual privacy levels
with open office
environments

visual privacy levels, wanted a door (closed office), or mentioned other improvements desired. Figure 7 also shows 80 and 83 percent were okay and liked the visual privacy level, respectively.

Some occupants were concerned with acoustical privacy levels that hindered individual work. Figure 8 demonstrate that acoustical privacy levels were a challenge in open office environments. Acoustical concerns could be addressed by providing small workrooms or closed offices for when employees need isolated space to work effectively. Educating employees on open office etiquette, distributing white noise, and offering breakout rooms for conference calls or confidential conversations could also be advantageous for open office environments as suggested by interviewees.

7.9 Employee morale

Employee morale is a critical component to employee satisfaction and ties in closely with several aspects of a company including work conditions. Observed improvements included employees enjoy coming to work more and increased coworker helpfulness. The interviewees were positive about their company’s sustainability efforts and the current condition of their company. For example, 78 percent enjoyed coming to work more now than in the previous conditions. The work conditions are tied into employee morale to comprise employee satisfaction. Except acoustical concerns, all aspects of work conditions and employee morale showed positive signs of the companies after embracing sustainable business practices. Embracing sustainable business practices showed an increase in employee satisfaction that could lead to improving firm strategic performance.

8. Project opportunities analysis

Project opportunities can be hard to determine with limited access to private company information. This section looked at corporate values, social responsibility, community involvement, and attracting clients like drivers of project opportunities.

Figure 9 shows the interviewees confirmed sustainability was a corporate value with 86 percent reporting sustainability was a moderate to very high-level corporate value. In all, 55 percent indicated sustainability was a high or very high-level of a corporate value. The remainder of respondents responded moderate to high, with only three respondents unsure. No negative responses were received.

Responses were consistent, 44 percent of respondents observed an increase in social responsibility and community involvement as illustrated in Figure 9. The balance of interviewees did not report a change, and no interviewees indicated there was a decrease in social responsibility and community involvement. A little over half of

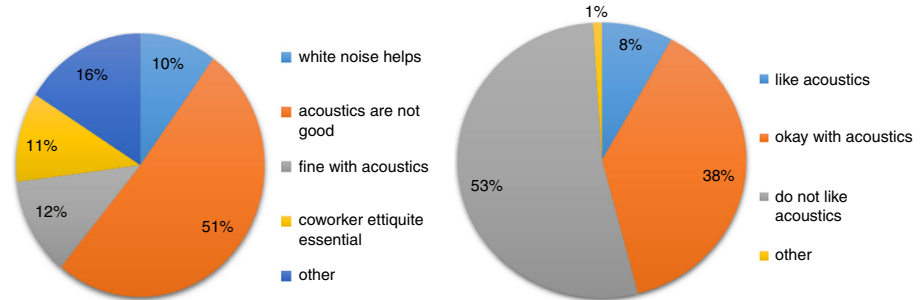


Figure 8.
Acoustical privacy
levels with open
office environments

interviewees ($n=56$) indicated the company had a commitment to sustainability on projects that were not LEED focussed. The results illustrated in Figure 10 show a higher percentage than expected since costs often drive project decisions.

Interview responses were the same for attracting clients and talent, and this showed 86 percent believed the sustainability efforts attracted clients and talent. Responses to retaining clients and talent were identical. In all, 87 percent believed the sustainability efforts attracted new clients; new clients attract more project opportunities.

Positive and neutral effects were observed for corporate values, social responsibility, and community involvement. These indicators of increasing project opportunities could lead to improved firm performance because of a greater opportunity for increased revenue and more opportunity to select the best projects for the firm.

8.1 Market advantage analysis

This paper looked at attracting and retaining talents, company culture, and project planning and execution as factors influencing market advantage. In all, 94 percent indicated recycling and composting was easy in their new environment. It could be a market advantage by attracting and retaining environmentally conscious clients by demonstrating the company is acting upon their values. A statistically significant correlation ($p=0.0140$) was found with attracting new clients/talent and retaining clients/talent indicating consistency in these responses. The association between attracting new clients/talent and CSR was statistically significant ($p=0.0049$). In all, 44 percent indicated an increase in CSR and no responses indicated a decrease.

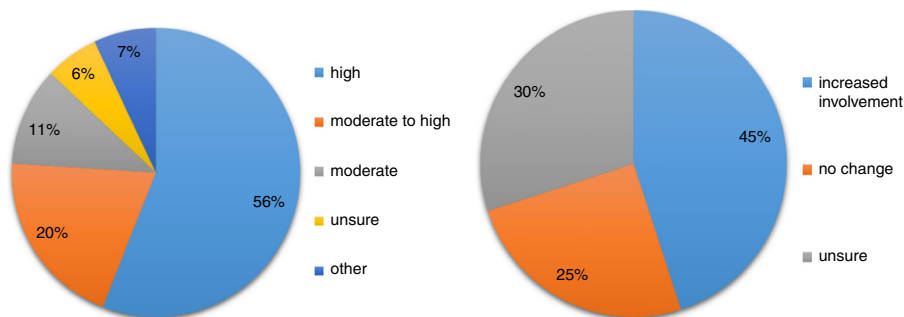


Figure 9.
Corporate value,
social responsibility,
and community
involvement

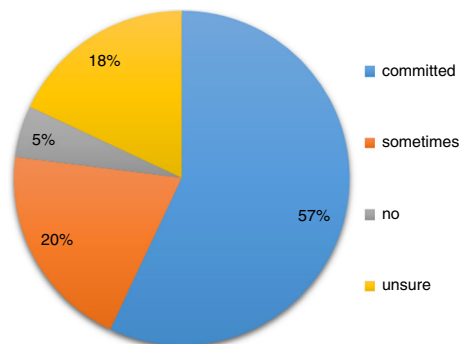


Figure 10.
Commitment to
sustainability on
non-LEED projects

Figure 11 shows overall responses and more detailed responses. Interview analysis indicated mixed opinions regarding changes to the company culture after focusing on sustainability with 42 percent of responses positive, 5 percent negative, and 54 percent indicating no change or unsure.

The responses in Figure 11 showed positive and neutral responses for aspects related to market advantage. It indicated embracing sustainable business practices has a neutral to positive impact on the market advantage.

8.2 Current conditions of select contractors

Building LEED certified headquarters or a sustainably focussed renovated headquarters was a large capital investment and a visible reflection of the values of their employees and the community. Several individuals noted how their company sustainable efforts made them more aware of their choices about sustainability and that effort carried over into their personal lives. Becoming more conscious of sustainability impacts helped individuals make more sustainably informed decisions in their daily lives.

8.3 Summary

Positive impacts were observed for individual workspaces, common areas, and meeting rooms. Acoustical conditions were the only notable concern with the work conditions. High satisfaction levels were observed with daylighting, indoor air quality, and visual conditions. Employee morale was driven by coworker helpfulness and work conditions. Sustainable efforts positively affected employee satisfaction. The sustainable efforts helped to attract and retain clients and talent. Some observations indicated improved planning efforts and project execution. Market advantage also improved since embracing sustainable business practices. These contractors exceeded the sustainable efforts in the construction industry.

9. Case study selection

This JE Dunn headquarters project was selected since it was a crucial turning point for JE Dunn embracing sustainable business practices. This project was built by one of the three contractors highlighted in the interview section of the paper. There was already a relationship with this company and support for the research; therefore, this project was more accessible. Additionally, the project was geographically close to the investigator that facilitated multiple site visits, multiple interviews, and access to follow-up.

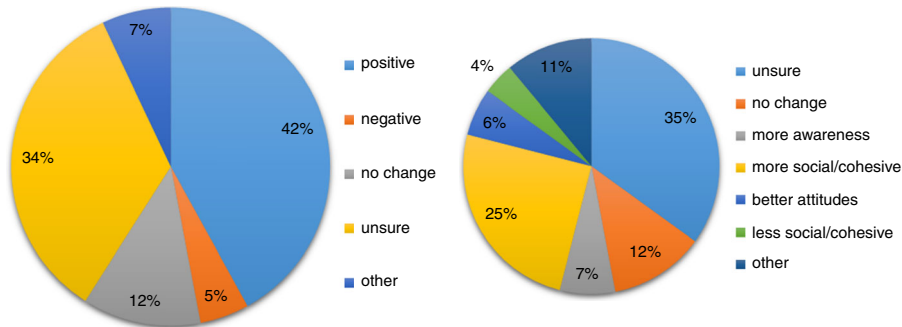


Figure 11.
Aggregate and
detailed culture
changes

9.1 Case study procedures

The case paper procedures were conducted based on the following six steps:

- (1) review project documentation and onsite project investigation;
- (2) develop interview questions;
- (3) identify, contact, and schedule interviews with key project team members;
- (4) conduct in-depth interviews of key project team members;
- (5) review and assimilate project documentation, observations, and interviews; and
- (6) review and discussion of chapter with case paper interviewee.

In step 1, archived documentation for the project was obtained electronically from JE Dunn. Documentation included project design and construction documentation for the project. Extensive time spent in the headquarters building observing work conditions was also useful in gaining an understanding of the project. Focus was primarily on strategic performance impacts, but also considered individual details, project details, and individual impacts. In step 3, the key team members were discovered during the documentation review. In step 4, in-depth interviews of team members for the JE Dunn headquarters project were conducted to discover insight into this project and impacts on JE Dunn. All of the key project team members who still work for JE Dunn were interviewed. In step 5, the data collected was reviewed and assimilated.

9.2 Case study findings

Strategic performance impact responses were 93 percent positive, and 7 percent are neutral responses. No negative responses were received in the case study interviews. The key project team members consistently observed positive impacts from this project and company sustainable business practices as a whole. The following sections discuss strategic performance impacts in detail. This case study investigated the JE Dunn headquarters project with a thorough review of the project following detailed procedures. A review of the LEED and sustainable attributes of the project provided insight into the project details.

Findings from this case study supported the survey and interview results. Specifically, the case paper of the JE Dunn headquarters project provided additional support that JE Dunn was ahead of the overall construction industry sustainable efforts established in the survey analysis. The case study results supported positive impacts on employee satisfaction and are even more conclusive regarding positive impacts on project opportunities and market advantage. The case study indicated that sustainable business practices might have a significant impact on individual staff. While revenue was considered, no trends were discovered likely due to an economic recession. The case study verified positive impacts of sustainable business practices on firm strategic performance through employee satisfaction, project opportunities, and market advantage.

10. Results and conclusions

This paper employs a three-dimensional approach to surveys, interviews, and a case study to examine the impact of sustainable business practices on performance. The interviews at three general contractors that embrace sustainable business

practices discover a positive impact on firm strategic performance. The case study supports the findings from the surveys and interviews with regards to the sustainable business practices impact on a project level analysis. This paper addresses the current state of sustainability in construction. It investigates the impact of sustainable business practices. The findings from this paper also indicate a paradigm shift or fundamental change in approach is occurring at the contractors interviewed. The next three sections elaborate upon these findings.

10.1 The current state of sustainability in construction

Initial efforts by contractors include a relatively high rate of recycling both on the site and at the office. Other aspects of sustainable business practices have relatively low levels of participation. Not many contractors have sustainability as a component of mission statements, corporate strategic plans, and operational business plans. Many contractors expressed anticipation for more regulations involving sustainability and a belief that LEED is a passing trend. Myers (2005) indicated the complexity of the construction industry impedes the ability to make rapid or drastic improvements. This paper substantiates this indication. The paper confirms the need for sustainability improvements in the construction industry. This paper demonstrates that there is considerable opportunity for improving sustainability efforts in commercial building construction. Findings from this paper show contractor that embrace sustainability practices experience positive impacts following this commitment. The case paper extends that finding and supports that sustainability focussed projects have positive impacts on their occupants as well.

10.2 Impact of sustainable business practices

These selected companies emphasize sustainability and sustainable actions in both the office and field. The case study of the JE Dunn headquarters project echoed the positive impact of sustainability on firm strategic performance thus providing validation to the interview analysis. The surveys indicate productivity is important and improving productivity improves performance. Employees enjoy coming to work, as the interviews and case study illustrate, so employees are likely to be more engaged, have fewer absences, and enhance firm performance. The current study expands upon this idea by illustrating market advantage in the construction market because clients may support premiums for ethical projects and contractors over less ethical.

The specialty and general contractor surveys indicated that incremental steps of sustainability are observed including recycling efforts and indoor air quality plans. However, sustainability was not a principal consideration in the construction industry. Revisiting the supporting research questions, the interviews at three general contractors that embrace sustainable business practices found positive impacts on employee satisfaction through work conditions, employee morale, and coworker helpfulness. Enhancements in project opportunities were observed through community involvement and by attracting and retaining clients and talent. Market advantages were observed through company culture shifts, improvement in project execution.

The case study of the JE Dunn headquarters project helped verify the interview findings and confirm benefits of embracing sustainability on a project level. This paper discovered that contractors experience positive impacts from sustainable business practices on firm strategic performance through employee satisfaction, project opportunities, and market advantage.

In summary, sustainable business practices are beneficial to society and favorable for the construction business. Embracing sustainable business practices has a positive impact on firm strategic performance for commercial building contractors through employee satisfaction, project opportunities, and market advantage. Sustainable business practices extend into the lives of individuals involved which exceedingly impacts society. The construction industry has advanced sustainability efforts, but there is a long way to go on the journey to being better stewards of the environment and resources.

11. Limitations and future studies

This paper was bounded by limited data. Since most construction companies are privately held, information shared in this paper was restricted to protect proprietary information. Demographics, financials, and client information could not be disclosed. First, the case study selection was also limited to projects the contractors were both willing and contractually permitted to disclose. Future multiple case studies of publicly held companies would be advantageous to review firm financial performance about sustainable business practices. Additional case studies of contractors that are not considered sustainable or in the process of implementing sustainable business practices would also be beneficial. While corporate sustainable practices are considered to be the primary factor in this paper to address the impact of employee satisfaction, business opportunities and business advantages, future study is to consider other primary factors to understand their impacts, respectively.

Second, a rival theory became apparent during the investigation that a new building consolidating all local company employees could have an impact on firm strategic performance. Third, this paper is confounded by a great recession that made project opportunities and revenue considerations analysis problematic. Some information regarding these aspects were helpful; however, expanding this paper during a more stable and typical economic period could provide additional insight.

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Further reading

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