# Sustainability Considerations in Capital Budgeting Decisions: A Survey of Financial Executives

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**Abstract**

This study focuses on the environmental dimension of sustainability and examines the impact of sustainability on capital investment decisions. In particular, this study aims to reveal whether the extent to which an investment is considered to be in sustainable technologies affects capital investment decisions. Based on our analyses of responses to an online survey facilitated by the IMA, the study finds that, for most companies, the sustainability dimension is not a significant consideration in capital investment decisions. That is, capital investment opportunities are evaluated based on traditional financial measures, such as net present values or internal rates of return. Results are generally not affected by the existence of a formal sustainability program, company size, or whether the company is publicly or privately-held.

*JEL classification*

**Keywords:** Sustainability, Capital budgeting, Capital investments, Survey

In recent years, much attention has been given to the impact of human activities on the global environment. Media reports of the impact of green-houses gases (carbon dioxide being the predominant greenhouse gas discussed) on climate change proliferate. In response to this, many companies have proclaimed a commitment to sustainable business practices with the belief that sustainability will provide competitive advantages in the long-term (Haanaes, 2011). Research related to sustainability has focused on implementing sustainability programs and the opportunities created by sustainability within organizations (Hopkins, 2010). However, there is little research addressing how sustainability affects capital investment decisions. In this research, we conduct a survey that examines how sustainability influences capital budgeting decisions of firms. We believe that our research provides insight into the behavior of practitioners in response to media concerns over sustainability and global climate change. It is important to understand whether companies are "walking the walk" or just "talking the talk" when it comes to investments in sustainable technologies. If it is important that companies change their assessments of the importance of sustainability in investment decisions, then we must have a benchmark to measure progress over time. We believe that this current research provides such a benchmark.

## 1. Literature Review

Most capital budgeting survey research focuses on the methods firms use in evaluating capital investment opportunities and generally does not address the impact of nonfinancial factors on capital budgeting decisions. Capital budgeting survey research that does include nonfinancial factors tends to be older, while more recent research generally focuses on the use of quantitative models in capital budgeting decisions. Perlick and Weatherford (1991) surveyed small, rapid-growing firms to identify differences in capital investment procedures based on the companies' rates of growth. Their survey instrument addressed certain qualitative measures, such as strategic planning, capital structure, and measures of risk, but not sustainability. In a survey of the capital budgeting processes of large hospitals (excluding VA hospitals) Kamath and Oberst (1992) include certain qualitative factors, such as facility needs, physician demand, and community demand in their survey instrument. Sustainability was not among the qualitative factors addressed in their survey. Chen (1995) surveyed chief financial officers of publicly-held manufacturing firms. His survey data are used to investigate differences in capital budgeting techniques based on the reason for the investment (replacement, expansion of existing product lines, or expansion into new product lines). Chen (1995)

found that discounted cash flow (DCF) methods were increasingly popular among respondents in evaluating capital investment opportunities. While Chen's survey instrument addressed certain nonfinancial factors, such as strategy, flexibility, and quality in the decision-making process, sustainability was not addressed. In a survey of publicly-traded firms in the US, Chen (2008) examined the interaction of financial and nonfinancial measures in capital budgeting decisions. Nonfinancial factors addressed in his survey include firm strategy, company growth potential, and competition, but not sustainability.

Recent capital budgeting survey research generally focuses on quantitative methods used in capital investment decisions. Graham and Harvey (2002) surveyed the CFOs of Fortune 500 companies and certain members of Financial Executives International to investigate capital budgeting techniques in the context of capital structure decisions. Nonfinancial factors, such as sustainability, were not addressed in their survey instrument. Ryan and Ryan (2002) surveyed the CFOs of Fortune 1,000 companies and found that net present value (NPV) is "the most preferred tool" used in capital budgeting decisions. Block (2005) used a survey of Fortune 1,000 executives to identify industry-related differences in capital budgeting procedures. Danielson and Scott (2006) report on a survey of the capital budgeting practices of small firms (defined as firms with fewer than 250 employees) compiled by the National Federation of Independent Business. Survey results indicate that large firms tend to rely on DCF methods while smaller firms tend to rely more on payback period and manager's "gut feel" to evaluate capital investment opportunities. Consistent with this, Prather, Topuz, Benco, and Romer (2009) surveyed members of a local chamber of commerce and found that managerial judgment or "gut instincts," rather than more sophisticated DCF models, is used by 66 percent of respondents for evaluating capital investment opportunities. None of these survey instruments addressed the impact of qualitative factors in the evaluation and ranking of capital investment opportunities.

Results of international capital budgeting survey research are generally consistent with patterns found in the US. Correia and Cramer (2008) surveyed publicly-listed companies in South Africa regarding capital budgeting methods and capital structure. They find that most respondents use DCF methods such as NPV and the internal rate of return (IRR) to evaluate capital investment opportunities. Correia and Cramer (2008) do not address the impact of nonfinancial factors, such as sustainability, on capital investment decisions. Verma, Gupta, and Batra (2009) surveyed the CFOs of manufacturing companies located in India to examine differences in capital budgeting procedures based on qualitative measures such as company size, CEO education level, and company age, but did not address sustainability.

An area of research related to sustainability focuses on the triple bottom line, first identified by Elkington in 1998. The triple bottom line is often described as the three Ps – people, planet, and profit. Research related to the planet aspect of triple bottom line has largely focused on improving the sustainability of operating procedures and practices. Research related to capital budgeting and triple bottom line has generally been limited to the development of theoretical models that would incorporate the triple bottom line into the capital budgeting decisions of municipalities (Turan & Needy, 2013, and Hallerbach, Ning, Soppe, & Spronk, 2004). Turan and Needy (2013) develop a model for capital investment decisions that incorporates aspects of the triple bottom line. They apply their models to capital investment decisions made by two municipalities located in Pennsylvania. Investment options evaluated were all in sustainable technologies. Hallarbach et al. (2004) propose a model to assist in the management of portfolios of socially responsible (sustainable) investments. The current paper differs from these papers in that we evaluate the impact of sustainability when for-profit organizations decide among a variety of sustainable and non-sustainable investment opportunities.

### *1.1 Commitments to Sustainability and Capital Budgeting*

While many companies proclaim a commitment to sustainability, our research question was how many actually follow through on this commitment in their day-to-day activities. A recent report co-sponsored by the *MIT Sloan Management Review* and the Boston Consulting Group found a significant disconnect between thought and action when companies address sustainability issues (Kiron, Kruschwitz, Rubel, Reeves, & Fuisz-Kehrbach, 2013). The report surveyed executives and managers across the globe. Nearly two-thirds of the respondents rated social issues, such as pollution and employee welfare, as being either significant or very significant issues for their organizations. However, only about 40 percent of their respondents indicated that their organizations were actively addressing those issues (Kiron, et al, 2013). This research questions whether there is a similar disconnect between thought and action when it comes to capital investment decisions.

Traditionally, organizations have relied on financial methods when evaluating capital investment opportunities. Such methods typically use DCF models, and decisions to accept or reject investment opportunities rely on rankings of projects' net present values and internal rates of return based on projected net future cash flows (Graham & Harvey,

2002). While it is relatively easy to quantify incremental revenues and costs resulting from capital investments, it is difficult to quantify non-monetary aspects of investments, such as intangible benefits that might accrue to an organization if it invests in sustainable technologies. This study explores how qualitative factors such as sustainability affect companies' evaluations of capital investment opportunities.

One of the challenges when conducting research on a subject as broad as sustainability is to adequately define sustainability. There are many definitions to choose from in current literature (Badiru, 2010). This research uses one of the definitions promulgated by the Global Reporting Initiative (GRI). GRI has set the standard for sustainability reporting and disclosure by major US and global corporations. Indeed, the G-8 has encouraged the use of GRI reporting as the standard to achieve societal and environmental goals (Matthews & Rusinko, 2010). The GRI definition of sustainability used in this survey instrument was:

"The environmental dimension of sustainability concerns an organization's impacts on living and non-living natural systems, including ecosystems, land, air, and water. Environmental Indicators cover performance related to inputs (e.g., material, energy, water) and outputs (e.g., emissions, effluents, waste). In addition, they cover performance related to biodiversity, environmental compliance, and other relevant information such as environmental expenditure and the impacts of products and services." (Global Reporting Initiative, 2011).

Haanaes, et al (2011) find that companies increasingly believe that sustainability will become a competitive advantage in the future. That study identifies certain companies (referred to by Haanaes as embracers of the benefits of sustainability) as being ahead of the curve by considering sustainability as part of their "core" business strategies. Many early sustainability adopters believe that preemptive sustainability strategies will generate more than typical first-mover advantages for their organizations leading to higher long-term returns (Hopkins, 2009). Haanaes et al (2011) report that approximately 59 percent of their survey respondents plan to increase their investments in sustainability in the near future. Early sustainability adopters are trying to find ways to quantify the impact of sustainability on their operations, presumably to incorporate these benefits into their DCF models (Haanaes, 2011). This study strives to see how non-quantitative measures of sustainability factor into capital investment decisions.

Investments in sustainable technologies are perceived to provide lower returns than investments in more traditional, non-sustainable technologies. Anecdotal evidence indicates that companies evaluate trade-offs between lower returns and higher sustainability when it comes to capital investments (Hopkins, 2010). That is, companies recognize that investments in sustainable technologies may have lower returns and longer payback periods (Haanaes, 2011). A way to improve returns and shorten payback periods is to increase prices or cut costs in other areas. However, research suggests that customers may not be willing to pay more for goods produced using environmentally sustainable technologies (Devinney, Auger, & Eckhardt, 2010). White (2009) finds that the majority of consumers will purchase "environmentally improved" products, but only if the products deliver performance and value commensurate with higher prices.

Thus, the motivation for this research is to determine how companies incorporate sustainability into the evaluation and ranking of capital investment opportunities. This approach uses an online survey of corporate executives and managers located within the US. This survey contributes to the literature in a number of dimensions. First, the scope of this survey is focused on sustainability and capital budgeting decisions. This is presumably the first study to consider both issues simultaneously. Second, the sample of IMA member firms was limited to individuals with direct involvement in capital investment decisions. Screening procedures used by IMA resulted in only one person from each member firm being solicited for participation, reducing the likelihood of duplicate responses.

We find that sustainability is not a significant consideration when making capital investment decisions, as most respondents indicate that sustainability was either not a consideration or that it was nice to have, but not essential for a capital investment opportunity to be accepted. When confronted with two investments that are ranked equally from a financial standpoint, most respondents said that they were either somewhat likely or very likely to choose an investment in sustainable technologies over one that is not in sustainable technologies. However, when the investment in sustainable technologies was ranked lower than an investment that is not in sustainable technologies from a financial standpoint, most respondents indicated they were either unlikely or very unlikely to select the investment in sustainable technologies. These results are not affected by whether or not a company has a formal sustainability program, the size of the company (measured by revenues), or whether the company is publicly-held or privately-held.

## 2. Data and Methodology

The survey used in this study was facilitated by the Institute of Management Accountants (IMA). The IMA has more than 70,000 members worldwide in financial positions ranging from executive officers to Accountants. The IMA membership represents a broad spectrum of industries. Data were collected using an online survey instrument prepared by the authors. The link to the survey instrument was distributed in October 2013 to certain IMA members. IMA sent solicitation emails to only one member per firm, based on IMA's membership records, to avoid duplicate responses from member firms. Survey recipients were limited to IMA members with titles ranging from Controller to Executive Officer in IMA's roster of regular members.

We received 57 usable responses to our survey. Manufacturing is the largest sector represented (44.2 percent of responses), followed by services (15.4 percent), and agriculture, mining and construction (13.5 percent). The manufacturing, and agriculture, mining and construction sectors are generally viewed as making the greatest contributions to greenhouse gases due to the nature of the activities involved in those industries. They are also most likely to make capital investments that would involve a decisions between sustainable and non-sustainable tangible assets. Therefore, we believe that the concentrations in these sectors is appropriate for a study of this nature. Table 1 provides the distribution of industries represented by survey respondents.

Table 1. Industries Represented by Survey Respondents

| Industry | Percentage |
|---|---|
| Agriculture, Mining and Construction | 13.5% |
| Manufacturing | 44.2% |
| Transportation, Communications, Electric, Gas, and Sanitary Services | 5.8% |
| Wholesale and Retail Trade | 7.7% |
| Finance, Insurance, and Real Estate | 3.8% |
| Services | 15.4% |
| Miscellaneous | 9.6% |
| Total | 100.0% |

This table provides the distribution of industries represented by survey respondents based on 2-digit SIC codes.

The majority (75 percent) of respondents represented companies with less than $500 million in revenues, with most of those reporting revenues of less than $50 million. Thirteen percent of respondents were from companies reporting more than $10 billion in revenues. We believe that this indicates an adequately broad-based sample in terms of company size. Table 2 provides the distribution of respondents based on size.

Table 2. Size of Respondents' Companies

| Revenues | Percentage |
|---|---|
| Less than $50 million | 37.7% |
| $50 - $100 million | 18.9% |
| $100 - $500 million | 18.9% |
| $500 million to $1.5 billion | 7.5% |
| $1.5 billion - $5.0 billion | 3.8% |
| $5.0 - $10 billion | 0.0% |
| Greater than $10 billion | 13.2% |
| Total | 100.0% |

This table provides the distribution of respondents based on size measured by total revenues.

The survey instrument was intended to solicit data regarding effect of sustainability on capital investment decisions. The survey provides a definition of sustainable investment before getting to any questions about sustainability. The study chose to focus on the environmental aspects of sustainability using the definition of sustainable technologies promulgated by the GRI to provide the context for survey questions. The survey asks specific questions about investments in sustainable technologies. The definition of sustainable technologies also came from GRI: "Sustainable technologies use less energy, fewer limited resources, do not deplete natural resources, do not directly or indirectly pollute the environment, and can be reused or recycled at the end of their useful lives." (Global Reporting Initiative, 2011).

The survey consisted of 30 questions and was intended to take respondents only 10 to 15 minutes to complete in order

to encourage participation.

## 3. Analysis of Results

The first step was to assess how widespread the GRI's reporting guidelines have been adopted by respondents. The GRI has extensive documentation available on its website and has become the world-wide leader in setting sustainability reporting and disclosure standards. While GRI appears to be the gold standard for sustainability reporting, relatively few respondents were familiar with GRI guidelines, and fewer still report that their companies had adopted GRI reporting guidelines. Only 17.5 percent of respondents reported that they were familiar with the GRI guidelines and only 30 percent of those familiar with GRI (5 percent of total respondents) reported that their companies had adopted GRI's reporting guidelines. Clearly, adoption of GRI standards has a long way to go before it can be considered widespread in the US.

Familiarity with GRI or adoption of GRI's reporting guidelines is not required for companies to establish formal sustainability programs. The survey asked respondents to indicate whether their companies had adopted formal sustainability programs, and compared these responses to responses to GRI related questions. The survey instrument did not specifically define what a formal sustainability program would look like. Rather, the study relied on respondents' perceptions of whether their companies had formal sustainability programs. Only 28 percent of respondents reported their companies had adopted formal sustainability programs. A 2012 survey of corporate executives reveals that approximately 29 percent of companies with annual revenues of greater than $1 billion have at least one member of management dedicated solely to sustainability (Loch & Buhay, 2012). Industries that are significantly more likely to have formal sustainability programs include manufacturing, educational services, and amusement and recreation services.

It was anticipated that those companies that had adopted GRI's reporting guidelines would be more likely to have formal sustainability programs. However, the survey revealed that only 19 percent of the respondents who reported that their companies had adopted formal sustainability programs had also adopted GRI's reporting guidelines, while only 31 percent of respondents who reported that their companies had adopted formal sustainability programs were familiar with GRI reporting guidelines.

Thompson and Baskin (2014) find that larger companies are generally more likely to be concerned with sustainability than smaller companies. The frequency of formal sustainability programs among respondents, partitioned based on firm size, is provided in Table 3. Respondents most likely to have formal sustainability programs represented companies with annual revenues in excess of $100 million.

Table 3. Frequency of Formal Sustainability Programs by Size

| Revenues | Percentage |
|---|---|
| Less than $50 million | 14.4% |
| $50 - $100 million | 7.1% |
| $100 - $500 million | 35.7% |
| $500 million to $1.5 billion | 0.0% |
| $1.5 billion - $5.0 billion | 7.1% |
| $5.0 - $10 billion | 0.0% |
| Greater than $10 billion | 35.7% |
| Total | 100.0% |

This table provides the frequency of formal sustainability programs among respondents, partitioned based on firm size.

The survey shows that 80 percent of companies reporting less than $500 million in revenues have no formal sustainability program. As expected, larger companies were more likely to have formal sustainability programs, as 66.7 percent of companies reporting revenues of $500 million or more reported having formal sustainability programs. It is likely that larger companies have the resources to devote to establishing and maintaining formal sustainability programs, while smaller companies lack sufficient resources to do so. Significantly more companies ($p < 0.10$) reporting revenues of less than $500 million do not have formal sustainability programs, while significantly more companies reporting revenues of between $100 million and $500 million and revenues greater than $10 billion report having formal sustainability programs. Figure 1 illustrates the frequency distribution of formal sustainability programs based on company size.

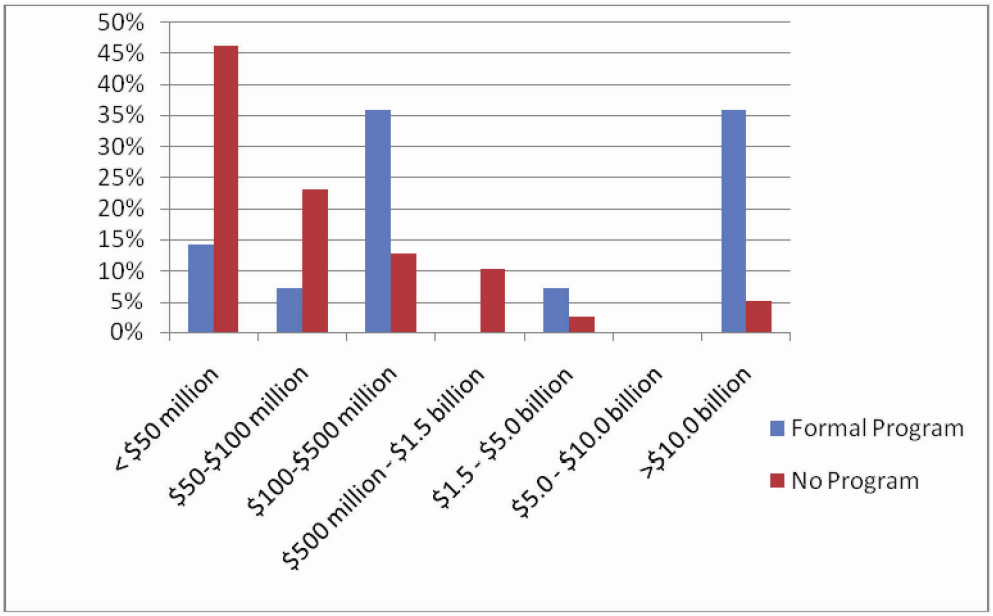


Figure 1. Frequency of Formal Sustainability Programs by Company Size

This figure partitions the sample by whether respondents' firms have formal sustainability programs. It illustrates the relative frequencies of formal sustainability programs based on firm size (measured by firm revenues).

The adoption of a formal sustainability program does not seem to be affected by company ownership. Approximately 20 percent of respondents work for companies that are publicly-held. However, the rate of adoption of formal sustainability programs is not significantly different for publicly-held companies than for privately-held companies, based on Wilcoxon rank sum tests ($Z = 1.3612$, $Pr > |Z| = 0.1735$).

The study aims to understand the motivation behind adopting formal sustainability programs. Hopkins (2009) reports that companies investing in sustainability are responding to pressure from, among other sources, customers, competitors and investors. Among respondents who report having formal sustainability programs, 75 percent reported that their companies are motivated by the desire to increase environmental awareness of sustainability for employees, customers, and suppliers, while 63 percent are motivated by the desire to be industry leaders in sustainability. Just over half (56 percent) of respondents feel that formal sustainability programs will lead to improved cost control, while half of respondents believe that having a formal sustainability program will lead to increased brand recognition. One respondent indicated that some of their customers require them to have a formal sustainability program. Another respondent stated that "eliminating waste and reducing energy costs HAS ALWAYS BEEN GOOD BUSINESS" (respondent's emphasis). Table 4 provides the distribution of reasons given by respondents for adopting formal sustainability programs.

Table 4. Reasons for Adopting Sustainability Programs

| Reason | Percentage |
|---|---|
| Improved cost control | 56.3% |
| Increased brand recognition | 50.0% |
| Increased market share for products and services | 25.0% |
| Increased profit margins | 43.8% |
| Leadership within our industry | 62.5% |
| Environmental awareness for our employees, customers, and suppliers | 75.0% |
| Other | 18.8% |

This provides the distribution of reasons given by respondents for adopting formal sustainability programs. The total of the percentages in this table is greater than 100% as most respondents listed more than one reason for adopting a formal sustainability program.

There is some evidence in extant literature that customers influence companies' decisions related to the adoption of sustainability strategies. Respondents were asked about the impact of customers on their decisions to have formal sustainability programs, that is, to "go green." The study finds that approximately 32 percent of respondents agree or

strongly agree with the statement that their customers are concerned that their companies are green, while over 35 percent of respondents either disagree or strongly disagree with this statement. The majority of respondents do not seem to feel pressure from customers to increase their sustainability activities. Table 5 provides the distribution of responses to this question.

Table 5. Customers are Concerned That My Company Invests in Sustainable Technologies

| Response | Percentage |
|---|---|
| Strongly disagree | 15.8% |
| Disagree | 19.3% |
| Neither agree nor disagree | 33.3% |
| Agree | 24.6% |
| Strongly agree | 7.0% |
| Total | 100.0% |

This table provides the distribution of responses to the question "My company's customers are concerned about whether my company is a "green" company (i.e., a company that invests in sustainable technologies)."

Responses to questions regarding the influence of customers on firms' decision to "go green" are partitioned based on whether respondents' firms gave adopted formal sustainability programs. Approximately 44 percent of respondents whose firms have adopted formal sustainability programs either agree or strongly agree with the statement that their customers are concerned that their companies are "green." Less than 27 percent of respondents whose firms do not have formal sustainability programs indicate agreement or strong agreement with this statement.

Figure 2 provides a comparison of responses based on the existence of formal sustainability programs. Wilcoxon rank sum tests are run on the differences shown in Figure 2 between firms with and without formal sustainability programs. Differences shown in responses based on the existence of formal sustainability programs are generally not significant, with the exception of respondents indicating strong agreement that customers are concerned that their companies are green. Z scores, along with their statistical significances, are provided for each response in Figure 2. Responses to this question were partitioned between respondents with and without formal sustainability programs. We find that differences in mean scores are not significant at traditional levels ($Z = 1.4311$, $Pr > |Z| = 0.158$). This result provides further evidence that customers' perceptions do not have a significant effect on the likelihood of companies having formal sustainability programs.

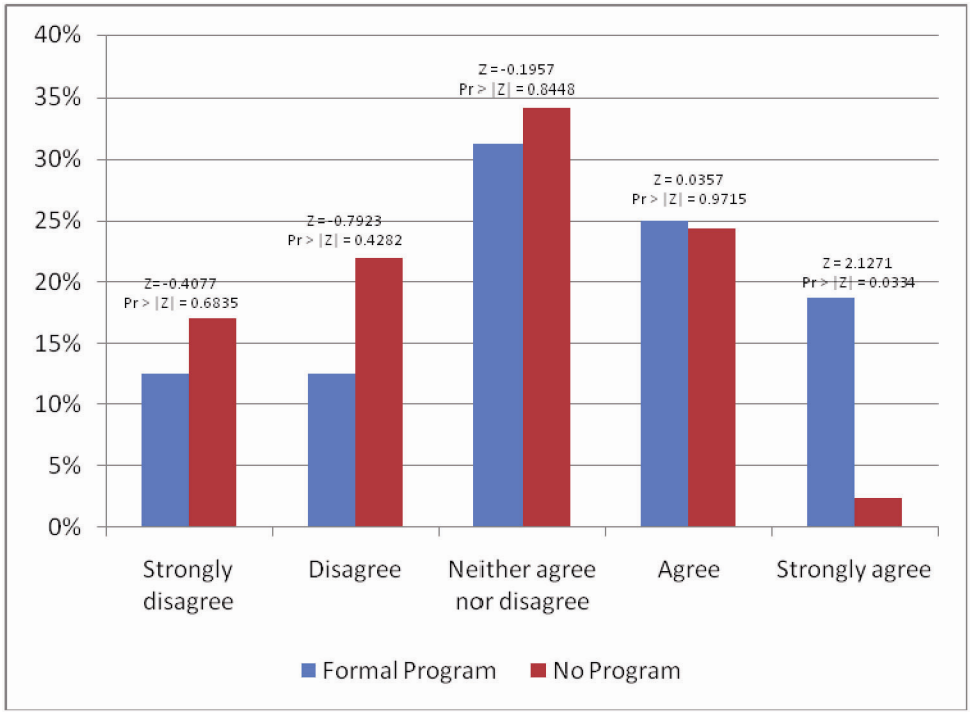


Figure 2. Customers are Concerned That My Company Invests in Sustainable Technologies Based on the Existence of a Formal Sustainability Program

This figure provides the distribution of responses to the question "My company's customers are concerned about whether my company is a "green" company (i.e., a company that invests in sustainable technologies)" for firms with and without formal sustainability programs.

Since over 70 percent of respondents reported that their companies do not have formal sustainability programs, the authors wanted to understand the reasons these companies had not yet done so. Thirty-six percent of respondents stated that they compete on price, not on issues such as sustainability, while 29 percent of respondents believe that a formal program is not needed to show a commitment to sustainability. Approximately 22 percent of respondents felt that their stakeholders have not indicated that sustainability is important to them. It is not clear whether this means that their stakeholders are not concerned about sustainability or that they have not adequately communicated their interest in sustainability. Loch and Buhay (2012) report that the primary reasons given by respondents to their survey for not "going green" are not enough return on investment, consumers' unwillingness to pay a premium for green products or services, and difficulty evaluating sustainability across the life cycle of a product.

Some reasons given for not having a formal sustainability program are less sanguine than those given for having a formal program. One respondent in the lumber and wood products sector stated that "Sustainability should remain a hobby for those that are interested in it and not be forced upon businesses." Another respondent in the manufacturing sector stated that "We view good stewardship of resources (including energy and waste) to be a longstanding staple of good business. Most of the rest of it is eye candy, ear candy, and phoney (sic) PR." Other responses were more positive, with respondents stating that formal programs are "in process" or that they would like to adopt a formal program but are unsure how to get one started. Table 6 provides the relative frequencies of the reasons given for not having a formal program.

Table 6. Reasons for Not Adopting a Formal Sustainability Program

| Reason | Percentage |
|---|---|
| Sustainability programs are too costly | 10.3% |
| We do not need a formal program to demonstrate our commitment to sustainability | 30.8% |
| Our industry competitors have not adopted formal sustainability programs | 15.4% |
| Our stakeholders have not indicated that sustainability is important to them | 23.1% |
| We compete on price, not on issues such as sustainability | 38.5% |
| Other | 10.3% |

This table provides a summary of the reasons why respondents' firms chose **not** to adopt formal sustainability programs. The total of the percentages in this table is greater than 100% as many respondents listed more than one reason for not adopting a formal sustainability program.

**4. Impact of Sustainability on Capital Investment Decisions**

The primary focus of this research is to determine the effect, if any, that sustainability has on capital investment decisions. Respondents were asked several questions to determine the degree to which an investment decision is based on the investment being in sustainable technologies. Two-thirds of the respondents indicated sustainability does not have a significant effect on capital investment decisions, stating it is either not a consideration or that sustainability is nice to have, but not essential for a capital investment to be approved. Almost 25 percent of respondents indicated that investments in sustainable technologies are more likely to be considered, but not necessarily approved. Only seven percent of respondents indicated that investments in sustainable technologies are more likely to be approved while less than two percent of respondents indicated that investments that are not in sustainable technologies will not even be considered. Table 7 provides a summary of survey responses.

Table 7. Impact of Sustainability on Capital Investment Decisions

| Response | Percentage |
|---|---|
| Whether an investment is in sustainable technologies is not a consideration in investment decisions | 21.1% |
| It would be nice if an investment were in sustainable technologies, but it is not essential | 45.6% |
| Investments in sustainable technologies are more likely to be considered | 24.6% |
| Investments in sustainable technologies are more likely to be approved | 7.0% |
| Investments that are not in sustainable technologies will not be considered | 1.8% |
| Total | 100.0% |

This table provides a summary of responses to the question "How does the extent to which projects are considered to be investments in sustainable technologies affect your company's capital investment decisions?"

*4.1 Impact of Formal Sustainability Programs on Investment Decisions*

It was expected that companies with formal sustainability programs would be more swayed by sustainability when making capital investment decisions. However, 50 percent of respondents with formal sustainability programs indicated that the sustainable nature of the investment is either not a consideration or that it is nice, but not essential, that the investment were in sustainable technologies. Interestingly, the only respondents indicating that investments would not be considered unless they are in sustainable technologies are those without formal sustainability programs. Among respondents with formal sustainability programs, 25 percent indicated that investments in sustainable technologies were more likely to be considered, while 19 percent indicated that investments in sustainable technologies are more likely to be approved. Figure 3 provides a comparison of the effects of sustainability on capital investment decisions for respondents with and without formal sustainability programs. Wilcoxon rank sum tests reveal significant differences in certain of the data reported in Figure 3 between firms with and without formal sustainability programs. Significantly more respondents without formal sustainability programs indicate that sustainability is not a consideration in capital investment decisions, while significantly more firms with formal sustainability programs indicate that investments in sustainable technologies are more likely to be approved. Z scores, along with their statistical significances, are provided for each response in Figure 3.

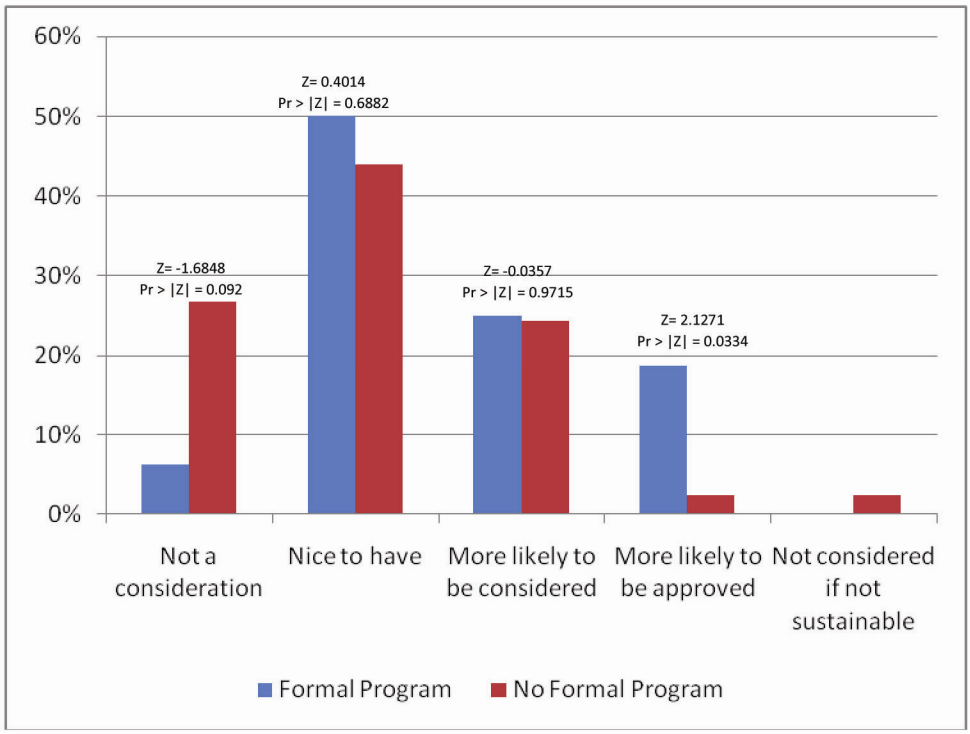


Figure 3. Impact of Sustainability on Capital Investment Decisions Based on the Existence of a Formal Sustainability Program

This figure provides the distribution responses to the question "How does the extent to which projects are considered to be investments in sustainable technologies affect your company's capital investment decisions?" for firms with and without formal sustainability programs.

Data are partitioned based on company ownership and differences in responses for publicly-held and privately-held firms for each category depicted in Figure 3 are not significant at traditional levels.

Another goal is to see if sustainability is a consideration when firms decide between two mutually exclusive investment opportunities. Respondents were asked to compare two investment opportunities, one of which is an investment in sustainable technologies and the other is not. In the first case, the two investments are equally ranked from a financial perspective. Almost 79 percent of respondents indicate that in this situation it is very likely or somewhat likely that an investment in sustainable technologies will be chosen over an investment that is not in

sustainable technologies. Only 5 percent indicated that it is unlikely the investment in sustainable technologies will be chosen. Table 8 provides a summary of responses to this question.

Table 8. Likelihood of Selecting an Equally Ranked Investment in Sustainable Technologies

| Likelihood | Percentage |
|---|---|
| Very unlikely | 0.0% |
| Unlikely | 5.3% |
| No effect on decision | 15.8% |
| Likely | 26.3% |
| Very likely | 52.6% |
| Total | 100.0% |

Respondents were asked to indicate whether an investment in sustainable technologies would get chosen over an investment that was not in sustainable technologies if they were both **ranked equally** from a financial standpoint.

The survey sought to illustrate how the existence of formal sustainability programs affected responses to this question. The study finds that over 80 percent of respondents without formal sustainability programs believed that it is somewhat likely or very likely that the investment in sustainable technologies will be selected, as compared to 75 percent of respondents with formal sustainability programs. Interestingly, only respondents with formal sustainability programs (approximately 19 percent of respondents) indicated that it was unlikely an investment in sustainable technologies would be chosen over an investment that was not in sustainable technologies, if both were equally ranked from a financial perspective. Figure 4 provides a summary of responses. Wilcoxon rank sum tests show that none of the differences shown in Figure 4 are significant at traditional levels. Z scores, along with their statistical significances, are provided for each response in Figure 4.

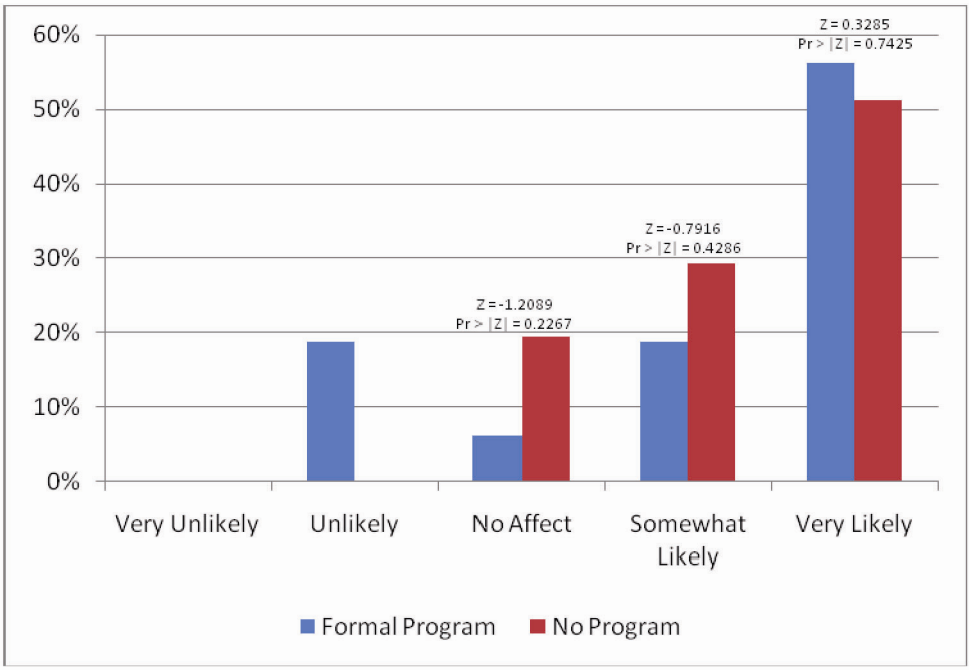


Figure 4. Likelihood of Selecting an Equally Ranked Investment in Sustainable Technologies Based on the Existence of a Formal Sustainability Program

This figure partitions the sample by whether respondents' firms have formal sustainability programs. It illustrates the impact of formal sustainability programs have on the likelihood that an investment in sustainable technologies would get chosen over an investment that was not in sustainable technologies if they were both **ranked equally** from a financial standpoint.

In the second case, the investment in sustainable technologies is ranked lower, from a financial standpoint, than the investment that is not in sustainable technologies. Respondents were asked how likely it was that their companies would approve the investment in sustainable technologies over a higher ranked investment not in sustainable technologies in this situation. Over 61 percent of respondents indicated that it is either unlikely or very unlikely that

the lower ranked investment in sustainable technologies would be approved over the higher ranked investment. Less than four percent of respondents indicated that the investment in sustainable technologies would be approved. Responses to these two questions indicate that, all things being equal, companies will choose to invest in sustainable technologies rather than non-sustainable technologies. However, these same companies are likely to select a higher ranked investment even though it is in non-sustainable technologies. This provides further evidence that companies are generally relying on traditional financial measures when making capital investment decisions. Table 9 provides a summary of responses.

Table 9. Likelihood of Selecting a Sustainable Investment That is Ranked Lower than a Non-Sustainable Investment

| Likelihood | Percentage |
|---|---|
| Very unlikely | 15.8% |
| Unlikely | 45.6% |
| No effect on decision | 19.3% |
| Likely | 15.8% |
| Very likely | 3.5% |
| Total | 100.0% |

Respondents were asked to indicate whether an investment in sustainable technologies would get chosen over an investment that was not in sustainable technologies if the investment in sustainable technologies was **ranked lower than** the investment that was not in sustainable technologies from a financial standpoint.

It was expected that the results reported in Table 9 would be influenced by the existence of formal sustainability programs. That is, it was projected that companies with formal sustainability programs would be more likely to select the lower ranked investment in sustainable technologies. Contrary to expectations, over 55 percent of respondents with formal sustainability programs indicate that they are very unlikely or somewhat unlikely to accept the lower ranked investment in sustainable technologies while only 25 percent of respondents with formal sustainability programs indicate that they are very likely or somewhat likely to accept the lower ranked investment in sustainable technologies. Interestingly, over 17 percent of respondents with no formal program prefer the sustainable investment over a higher ranked investment in non-sustainable technologies - a higher percentage than those with formal programs. Figure 5 provides distributions for respondents with and without formal sustainability programs. Z scores, along with their statistical significances, are provided for each response in Figure 5.

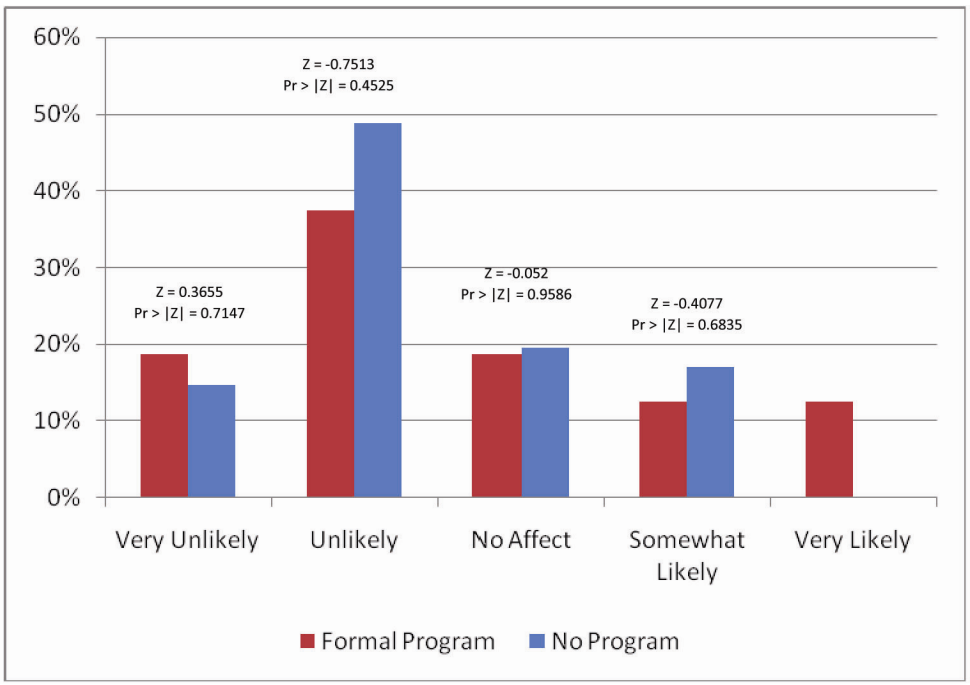


Figure 5. Likelihood of Selecting a Sustainable Investment That is Ranked Lower than a Non-Sustainable Investment Partitioned by the Existence of a Formal Sustainability Program

This figure partitions the sample by whether respondents' firms have formal sustainability programs. It illustrates the impact that formal sustainability programs have on the likelihood that an investment in sustainable technologies would get chosen over an investment that was not in sustainable technologies even if the investment in sustainable technologies was **ranked lower than** the investment that was not in sustainable technologies from a financial standpoint.

The results reported in Figures 1 through 4 were also partitioned based on company ownership. Differences in responses for publicly-held and privately-held firms are not significant at traditional levels.

## 5. Conclusion

Increased media focus on sustainability in recent years has led many companies to proclaim commitments to sustainable business practices. We use an online survey to assess the impact of sustainability on capital investment decisions made by financial executives of US based companies. We find that, while many companies proclaim their commitment to sustainable business practices, when it comes to capital investment decisions, sustainability is either not factored into the decisions or it is a nice, but not essential factor in the decision. We also find that the existence of formal sustainability programs generally does not affect the likelihood that investments in sustainable technologies are given preference over investments that are not in sustainable technologies. Additionally, survey results provide little evidence that respondents' customers' perceptions about the company being "green" affects the likelihood of a company having a formal sustainability program or influence capital investment decisions. Results reported herein are generally not affected by company size or company ownership (publicly-held vs. privately-held).

This is the first effort to investigate the role that sustainability plays in capital investment decisions. Additional research is needed to better understand the dynamics of sustainability considerations in capital budgeting decisions. It is likely that as triple bottom line and GRI become more widely accepted that companies will give more weight to sustainability in their capital budgeting decisions. If it is important that companies change their assessments of the importance of sustainability in investment decisions, then we must have a benchmark to measure progress over time. We believe that this current research provides such a benchmark.

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