# THE JOURNAL OF BUSINESS INQUIRY

Volume 16 Issue 1 (Special Issue) 2017





Utah Valley University Woodbury School of Business

ISSN 2155-4072 (online)

*The Journal of Business Inquiry* 2017, 16, Issue 1 (Special Issue), 1-3
http:www.uvu.edu/woodbury/jbi/articles/
ISSN 2155-4072

# Editorial
# Special Issue Guest Editors' Introduction: Sustainability and Innovation - Two Sides of the Same Coin

Sustainability and innovation have emerged as critical strategies in today's business environment. Companies – small or big, domestic or multinational, privately- or publicly-held – are increasingly focused on environmental sustainability and innovation in order to improve their competitive positions. To that end, scholars around the world are actively involved in researching these topics to understand their impact on organizations and society. This special issue is a collection of six eclectic articles written by scholars from around the world, and their findings have major implications for all constituencies.

The major factors that have influenced the rise of sustainability and innovation include the convergence of global and industry borders, the rise of the Internet and its spread across the developed and the emerging countries of the world, the coming of age of the millennial generation, an increased emphasis on corporate social responsibility, and a shift in the value chain from manufacturing and customer service to research and development among the BRICS nations (Brazil, Russia, India, China and South Africa) in recent years (Luo *et al.*, 2011).

The "people-planet-profit" framework coined by John Elkington is a cornerstone for sustainability studies. It postulates that businesses must consider the environmental and social impact of their actions (Jackson *et al.*, 2011). Innovation, a central theme for all organizations, is a critical strategy in itself and also provides a great opportunity for organizations to balance these three seemingly conflicting sustainability objectives.

This special issue covers empirical and conceptual research to enhance our understanding of the "people-planet-profits" framework, innovation, and their applicability to organizations and society. Based on blind reviews by experts in the field, six papers were accepted and have been published in this special issue. These articles span large and medium-sized corporations in the U.S. and other nations. Each paper is described below.

Angel investors represent a powerful constituency in the emerging and developing countries of the world. A significant number from this constituency now direct their investments to social impact projects. There is no yardstick such as a profitability ratio to assess these projects. Prakash Dheeriya (California State University) has created a mechanism to help investors and other decision makers judge such projects. Dheeriya's "index of goodness" is measured as the percentage of human population that will benefit from such an investment. It is therefore a good tool for angel investors, crowd funding platforms, and other decision makers who focus on the base of the income pyramid in emerging and developing nations to assess social impact projects.

Large publicly-held corporations play a balancing act between costs and benefits derived from such investments. In recent years, many companies have become proactive in integrating sustainability initiatives in their strategy mix (Baral and Pokharel, 2016). Companies with significant investments in this initiative and considered among the best-in-class in their industries

get a nod in the Dow Jones Sustainability Index (DJSI). Satish Joshi (Michigan State University), Vivek Pandey (Institute of Rural Management Anand), and Robert Ross (Michigan State University) examine the reaction of the stock market to changes in the membership of companies in the DJSI. In a sample of U.S. firms, they found that there were 196 additions to the DJSI and 133 deletions during the time period 2002-2011. Investors perceive deletion from the DJSI as an indicator of a failed strategy. While inclusion in the DJSI also generated a similar negative reaction, the authors conclude that the market assesses the benefits of sustainability efforts only in the context of costs that such efforts impose on a firm's performance. However, intangible benefits (such as image, higher reputation, and innovation) have a lag effect and are not immediately perceived by the market. As companies continue to embrace sustainability and innovation, these benefits will start manifesting themselves in the bottom line profits of these firms.

Sustainability initiatives in large or small organizations also need the full support of their top management teams in order to succeed. There is no shortage of research on CEO compensation and the relative pay differential between the CEO and the average worker. There are also many studies on diversity in the top management team and the board, and its impact on an organization's profitability. However, lacking in literature is the impact of these variables on sustainability initiatives. The article by Ravi Chinta (Auburn University at Montgomery) attempts to fill this lacuna. Using water productivity (a vital global resource) as a proxy for sustainability, he focuses his study on the top 100 global firms in sustainability. His findings reveal that greater CEO pay relative to the average worker results in poorer sustainability productivity. Greater gender diversity in the board of directors results in higher water conservation efforts by the organization. These findings not only have implications for company profitability, they also provide an opportunity to inform and influence public policy.

Innovation, another critical strategy in today's environment with major implications for sustainability, is the central theme of the remaining two articles in this special issue. Kathryn Keeton (University of Texas), Elizabeth Richard (EER Strategies LLC), and Jeffrey Davis (Exploring 4 Solutions) use the case study method to understand strategic innovation in government entities. The subject of their case study is NASA. By tracking the chronological development of the SMG (solution mechanism guide), their guide bridges strategic management and strategic innovation. In this era of shrinking budgets, it is important for government organizations to create best practices for innovation and disseminate these practices across the organization. Their study has broader implications for governments in other parts of the world, which play a significant role in defining and shaping the economic and public policies of their nations.

Sustainability studies have attracted the attention of scholars spanning all the disciplines of business. The theories that previous researchers have adopted to understand this phenomenon include agency and shareholder, legitimacy, institutional, stakeholder, signaling, and stewardship. In his article, Zabihollah Rezaee (University of Memphis) proposes a framework to integrate the theories and advances propositions to better understand the non-financial dimensions of sustainability. The ESG (environmental, social, and government) dimensions of sustainability are as important as financial performance. Today's millennial generation conducts much of its business using smart phones and the IoT (Internet of Things), which puts pressure on companies

to act in a socially responsible manner. Rezaee's research helps scholars and practitioners to understand these dimensions in an integrated context.

In the final paper of this issue, Ainul Mohsein Binti Abdul Mohsin, Hasliza Abdul Halim, Noor Hazlina Ahmad and Nadia Farhana (all authors from Universiti Sains Malaysia) assess the role of entrepreneurial competencies on innovative performance in a sample of 1,000 Malaysian manufacturing and service SME firms. Using a structural equation modeling approach (SmartPLS), their results reveal that conceptual and strategic thinking is related to innovative performance. Entrepreneurs need to focus on developing their conceptual and strategic thinking competencies to create innovation in their organizations. These findings are especially significant in today's environment, where industry borders have been blurred and transcontinental competition and collaboration have increased.

In conclusion, the papers reveal that sustainability and innovation are two sides of the same coin. Innovation in products, processes, or services against the backdrop of sustainability (Tsai and Liao, forthcoming) has the potential to provide a better understanding of how organizations function and succeed, and redefine the global business environment.

Daewoo Park, Ph.D.
Department of Management and Marketing
College of Business
Hawaii Pacific University
Honolulu, HI 96813
Tel.: (808) 544-1463
Email: dwpark@hpu.edu

Hema A. Krishnan, Ph.D.
Department of Management and Entrepreneurship
Williams College of Business
Cincinnati, OH 45207
Tel.: (513) 745-3420
Email: krishnan@xavier.edu

## References

**Baral, Nabin and Mohan P. Pokharel**. 2016. "How Sustainability is Reflected in the S&P 500 Companies' Strategic Documents." *Organization & Environment.* 29(1): 1-20.

**Jackson, Aimee, Katherine Boswell, and Dorothy Davis**. 2011. "Sustainability and Triple Bottom Line Reporting – What Is It All About?" *International Journal of Business, Humanities and Technology*. 1(3): 55-9.

**Luo, Yadong, Jinyun Sun, and Stephanie Lu Wang.** 2011. "Comparative Strategic Management: An Emergent Field in International Management." *Journal of International Management*. 17(3): 190-200.

**Tsai, Kuen-Hung, and Yi-Chuan Liao**. Forthcoming. "Sustainability Strategies and Eco-Innovation: A Moderation Model." *Business Strategy and the Environment*.

*The Journal of Business Inquiry* 2017, 16, Issue 1 (Special Issue), 4-11
http:www.uvu.edu/woodbury/jbi/articles/
ISSN 2155-4072

# On Evaluating Socially Responsible Investment Projects-Creation of an Index of "Goodness"

*By* PRAKASH L DHEERIYA*

*Many philanthropists, charitable foundations, and aid agencies are interested in impact investing, a method of investing that focuses on return to society, as opposed to return on investment. Investment projects that cater to societal needs are abundant, but there is no accepted yardstick, like an ROI, for such "impact" projects. In this paper, we create a mechanism that can help decision makers evaluate investments with a social benefit. We develop an index of the "goodness" of a project that can help investors rank projects. This "index of goodness" is easily understood, with its number representing the percentage of human population that will benefit from such an investment. By providing a comprehensive method for selecting among social projects, we help in allocating capital to its most socially beneficial purposes.*

**Keywords**: Investment Projects, Index, Goodness

JEL Classification: C51, D61, D63, G31, M14

## I. Introduction

Investing with the additional benefit of creating social good is now in vogue, with different terms being used, such as socially responsible investing, impact investing, responsible investing, corporate social responsibility, blended value, and economic, social, and governance investing. There are several academic papers on the pros and cons of such investing, as well as metrics used in measuring the "impact" or "social good." See, for example, Freeman and Reed (1983); DiMaggio and Powell (1983); Rogers (1995); Mulgan *et al*. (2011); Thornley *et al*. (2011), and Freireich and Fulton (2009), just to name a few. Many studies discuss the various metrics employed in evaluating the impact of such investments (Chew *et al*., 2011; EBAN, 2011; Ruttmann, 2012, and Grabenwarter and Liechtenstein, 2011). However, researchers agree there is a lack of uniformity and standardization among metrics used in all investments that purport to do "good" (Godeke and Pomares, 2010).

Impact investments may have different objectives, which makes developing metrics to evaluate them a difficult task. For example, Table 1 illustrates various impact objectives as defined by the Impact Reporting and Investing Network (IRIS). The Global Impact Investing Network (GIIN) and IRIS are widely recognized sources of measurement and reporting of impacts.

* Prakash L. Dheeriya, Ph.D., Professor of Finance, California State University Dominguez Hills, 1000 E. Victoria St., Carson, CA 90747. Email: pdheeriya@csudh.edu.

**Table 1: Impact Objectives**

| Increase incomes and assets for low-income or excluded people | Improve basic welfare for people in need | Mitigate climate change |
|---|---|---|
| Access to energy | Access to clean water | Biodiversity conservation |
| Access to financial services | Affordable housing | Energy and fuel efficiency |
| Access to education | Conflict resolution | Natural resources conservation |
| Access to information | Disease-specific prevention and mitigation | Pollution prevention and waste management |
| Agricultural productivity | Equality and empowerment | Sustainable energy |
| Capacity-building | Food security | Sustainable land use |
| Community development | Generate funds for charitable giving | Water resources management |
| Employment generation | Health improvement | |
| Income/productivity growth | Human rights protection or expansion | |

Source: IRIS. As defined at iris.thegiin.org.

In a 2015 GIIN study**,** "Introducing the Impact Investing Benchmark," impact themes were classified into six categories:

(1) **Financial inclusion:** The provision of financial services to populations that otherwise lack access. This includes investments in microfinance, small and medium enterprise (SME) finance, and community banking.
(2) **Employment:** Strategies that focus on job creation in areas of need, job quality improvement, and workforce development.
(3) **Economic development:** Investing in sectors that promote the improvement of economic conditions and standards of living. This includes companies contributing to basic infrastructure, such as transportation or telecommunications.
(4) **Sustainable living:** Improving access to healthy and environmentally friendly products and services. This includes organic health products and locally sourced foods.
(5) **Agriculture:** Investments along the food and agricultural value chain that are oriented towards efficient and sustainable practices and yield improvements to help feed more people at a lower cost and improve livelihoods of smallholder farmers.
(6) **Education:** Investing in innovations or business models that improve education outcomes or expand access to education.

In traditional investments, net present value, internal rate of return, return on investments, and payback periods are commonly used to evaluate and rank investment projects. The issue with impact investments is that the returns are not only financial, but are also socially beneficial. This makes evaluation of such investments very difficult. If no financial return is expected from such investments, then they take on the nature of "charitable donations." However, many impact investors do want a financial return as well as a social return.

In this paper, we construct an index that measures the "goodness" of impact investments. This index does not strive to evaluate investments using traditional metrics such as ROI, net present value, or profitability measures. If impact investors are only concerned with maximizing the social benefit, without regard to financial returns, then this index will give them a way to rank projects. The index captures the "goodness" aspect of investments by measuring the potential benefit to a segment of the human population. The greater the potential benefit to humanity, the greater will be the ranking of such an investment among all impact investments. An index of goodness will be able to answer questions such as if it is more beneficial to find a cure for prostate cancer, help

children in the African continent be literate, or develop a vaccine to cure AIDS. In the interpretation and use of such an index, one has to necessarily make assumptions about the number of the potential beneficiaries, as well as the duration of the impact for current and future generations.

This "index of goodness" is vastly different from and superior to existing socially responsible metrics. This index is more general and is widely applicable to all socially responsible investments. It does not limit itself to one specific area of social investments, as the existing metrics do. Due to its simplicity and construction, this index can be useful for measuring the impact of all social investments.

This paper is organized as follows: After the introduction is a section on index construction. Then there is a description of real life data used in the construction of the index, as well as a discussion on limitations and shortcomings of the index. The paper ends with our conclusions and suggestions for future research.

## II. Construction of the Index of Goodness

It is generally agreed that any socially responsible investment should do the maximum good, or help the greatest number of people, or touch human lives in a positive way. In this respect, given two investments, the one that benefits the greater number of people deserves to be funded first. In this regard, the term "people" includes adults and children, regardless of gender, age, and nationality. It is also assumed that financial returns from such investments are of secondary importance compared to their potential benefit to humanity.

To determine the size of the potential beneficiaries of any socially responsible investment, we make use of population data available from the World Bank's Data Bank[1].

The index of goodness for any investment is computed as follows: Potential beneficiaries times duration of benefit/total population with duration of benefit times 100.

For example, if an investment has its main goal of finding a cure for prostate cancer, then we can develop an index that can evaluate its goodness based on certain assumptions. If we assume males may develop prostate cancer at reaching 60, and average life expectancy of a male is 75 years, then the cure for prostate cancer will lead to an expected increase in life span of 15 years per male. If we multiply that by the total male population, and divide it by the total population, we will get a measure of what percentage of humanity will benefit from this investment. In other words, the index for such an investment will be: (Average life expectancy of a male minus age at which prostate cancer develops, say, 60)/(total population times average life expectancy of a human) X 100.

It is to be noted that the computed index in this example will be a very small percentage of humanity as this type of cancer affects (a) only males (b) and only males over a certain age.

Let us contrast this with another investment that focuses on children's education in, say, Africa. The benefit of such an investment will be equal to the product of the number of children in Africa times (average life expectancy of an adult minus the age at which a child is inducted into the literacy program). This benefit is then divided by the total population times life expectancy of a human and multiplied by 100 to yield a percentage. In both investment examples that are listed above, the ranking of those investments will be determined by the percentage of humanity that will benefit, or the value of the index of goodness. Once such indices are compiled for various

[1] Available at databank.worldbank.org.

investments, investors can gauge which socially responsible investments have the biggest "bang", and then evaluate them using traditional cost-benefit analysis.

## III. Numerical Example of Index Construction

Goal of investment: Finding a cure for prostate cancer in the U.S. (assuming males develop cancer at age 60).
Life expectancy of male at age 60 years (2012 data): 21.763 years (see Appendix B)
Life of male with prostate cancer (assumed): 60 years
Impact of investment (assuming prostate cancer was cured, and male lived up to his average life expectancy at age 60): 21.763 years
Life expectancy at birth in the U.S.: 71 years (2012 data) (see Appendix A)
Index = (21.763 years times 155,510,557)/(7,089,309,348 times 71 years) X 100 **= 0.67 % or 0.00672. This index is useful when ranking projects from all over the world.**

Index = (21.763 years times 155,510,557)/(314,112,078 times 78.7 years) X 100 **= 13.69 % or 0.1369**
**This index is useful when ranking projects within the U.S.**

Another example (data in Appendix C):
Goal of investment: Reduce the number of out of school primary school children in the Arab world
Impact = Reduce the number of out of school children from 6,461,655 to zero.
Index = 6,461,655/7,089,309,348 X 100 = 0.0**9 % or 0.00091**

## IV. Limitations of the Index

The construction of indices to be used in evaluating various investments is heavily dependent on data availability and is very data intensive. Assumptions need to be made on data reliability and during the interpretation of results. Consequently, indices can be easily misused to promote certain areas of investment.

Another limitation of an index of goodness is data availability. Most data used in the examples was for 2012, the latest year for which data was available in the World Data Bank resource.

The interpretation of the index can also lead to misleading conclusions. For instance, the very small value of the index may lead investors to believe that the impact of such an investment is too small to undertake. However, the benefits of reducing the out of school children population to zero may have far reaching societal implications, not only for the region, but also for the world. If investors take the leap of connecting the number of terrorist incidents in the world with number of out of school children, then this investment may not seem so bad.

Some may argue that costs, financial returns, and risks must also be considered while constructing an index. It is true that those are valid factors to be considered, but if only a small segment of the population benefits from an investment, we need to question whether the investor really wants to achieve maximum "goodness" with his investment.

## V. Conclusions

In this paper, we attempted to create a method of evaluating socially responsible investments by quantifying their impact on humanity. By using actual data, we created a yardstick by which we can measure the "bang" of the investment, and subsequently decide if these investments are worth undertaking. The underlying assumption of such an index is to maximize overall "goodness" without giving importance to dollar returns, risks, and costs.

Further research needs to be conducted on typical mainstream socially responsible investments to see if they have the most reach. If they do not, then the investor needs to question if his resources are better served in some other area, where the impact can be larger. After creating indices for various impact activities (such as childhood literacy, reducing harmful pollution, curing illnesses, etc.), one can then attempt to influence policy makers to adopt policies that do the most good, rather than what is trending in popular opinion.

## References

**Chew, E., R. Hodgkinson, and C. Lord.** 2011. *The Impact Investor's Handbook: Lessons from the World of Microfinance*. Equilibrium Partnership & CAF Venturesome: Market Insight Series, 5-8.

**DiMaggio, Paul J., and Walter W. Powell.** 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American Sociological Review*, 48(2): 147-60.

**EBAN.** 2011. *European Early Stage Impact Investing*, White Paper. http://www.eban.org/wp-content/uploads/2014/09/20.-White-Paper-European-Early-Stage-Impact-Investing.pdf (accessed October 16, 2016).

**Freeman, R. Edward, and David L. Reed.** 1983. "Stockholders and Stakeholders: A New Perspective on Corporate Governance." *California Management Review*, 25(3), 88-106.

**Freireich, Jessica, and Katherine Fulton**. 2009. *Investing for Social and Environmental Impact.* New York/Cambridge/San Francisco: Monitor Institute.

**Global Impact Investment Network (GIIN)**. www.thegiin.org (accessed October 2016).

**Godeke, Steven, and Raúl Pomares.** 2009. *Solutions for Impact Investors: From Strategy to Implementation.* Rockefeller Philanthropy Advisors, 11-13, 69, 115-17.

**Grabenwarter, Uli, and Heinrich Liechtenstein.** 2011. *In Search of Gamma – An Unconventional Perspective on Impact Investing.* Family Office Circle Foundation and IESE Business School University of Navarra, 7-9.

**IRIS**. **(Impact Reporting & Investing Standards) Registry**. iris.thegiin.org/registry (accessed January 2016).

**Mulgan, Geof, Neil Reeder, Mhairi Aylott, and Luke Bo'sher.** 2011. *Social Impact Investment: The Challenge and Opportunity of Social Impact Bonds.* The Young Foundation, 4-7.

**Rogers, Everett M.** 1995. *Diffusion of Innovations.* 4th edition, New York: The Free Press.

**Ruttmann, Robert.** 2012. *Investing for Impact: How Social Entrepreneurship is Redefining the Meaning of Return.* Credit Suisse Research Institute and the Schwab Foundation for Social Entrepreneurship, 5-22, 31-58.

**Thornley, Ben, David Wood, Katie Grace, and Sarah Sullivant.** 2011. *Impact Investing: A Framework for Policy Design and Analysis.* Insight at Pacific Community Ventures and the Initiative for Responsible Investment at Harvard University, 1-30.

## Appendix A: Gender Statistics Data

| | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|
| Life expectancy at Birth (total years)* | 70.7 | 71 | 71.2 | |
| Life expectancy at Birth (total years)-Males* | 68.7 | 69 | 69.2 | |
| Life expectancy at Birth (total years)-Females | 72.8 | 73.1 | 73.3 | |
| Life expectancy at Birth (total years)- U.S. | 78.6 | 78.7 | 78.8 | |
| GNI PER CAPITA (PPP)* | 13,379.50 | 13,925.80 | 14,373.30 | 14,931.30 |
| POPULATION 0-14 FEMALE* | 895,852,368 | 901,931,359 | 909,005,656 | 916,342,189 |
| POPULATION 15-64 FEMALE* | 2,265,482,900 | 2,292,245,153 | 2,318,807,119 | 2,344,729,432 |
| POPULATION 15-64 MALE* | 2,321,389,779 | 2,349,807,924 | 2,378,282,538 | 2,406,232,155 |
| POPULATION 15-64 TOTAL* | 4,586,872,483 | 4,642,052,979 | 4,697,089,557 | 4,750,961,575 |
| POPULATION 65+ FEMALE* | 299,155,716 | 306,420,100 | 314,624,353 | 323,802,185 |
| POPULATION FEMALE* | 3,460,490,888 | 3,500,596,515 | 3,542,437,126 | 3,584,873,998 |
| POPULATION MALE* | 3,546,979,913 | 3,588,712,833 | 3,632,084,233 | 3,675,836,679 |
| POPULATION MALE (U.S.) | 154,259,286. | 155,510,557 | 156,764,793 | 157,999,184 |
| POPULATION (TOTAL) U.S. | 311,721,632 | 314,112,078 | 316,497,531 | 318,857,056 |
| POPULATION TOTAL* | 7,007,470,801 | 7,089,309,348 | 7,174,521,359 | 7,260,710,677 |

Source: World Data Bank (Gender Statistics Database).
Note: Life expectancy data for 2014 is not yet available.
* Applies to world.

## Appendix B: Life Expectancy at Age 60 in Years in Various Countries (2012)

| | |
|---|---|
| Afghanistan | 14.9491239 |
| Albania | 19.22597183 |
| Algeria | 20.89253439 |
| Angola | 15.0893177 |
| Antigua and Barbuda | 19.954 |
| Argentina | 18.5829794 |
| Armenia | 17.03729826 |
| Aruba | 17.99876122 |
| Australia | 23.27622727 |
| Austria | 21.80329846 |
| Azerbaijan | 16.42822687 |
| Bahamas, The | 20.43457611 |
| Bahrain | 18.91558015 |
| Bangladesh | 18.23685586 |
| Barbados | 17.7612355 |
| Belarus | 14.51231983 |
| Belgium | 21.66445073 |
| Belize | 15.75477775 |
| Benin | 14.95703118 |
| Bhutan | 20.17208932 |
| Bolivia | 20.02302919 |
| Bosnia and Herzegovina | 18.45901157 |
| Botswana | 15.91900713 |
| Brazil | 19.42041195 |
| Brunei Darussalam | 20.12199817 |
| Bulgaria | 17.00187365 |
| Burkina Faso | 14.68117684 |
| Burundi | 15.76607776 |
| Cabo Verde | 17.32082802 |
| Cameroon | 15.03594436 |
| Canada | 23.08469433 |
| Central African Rep. | 15.03878084 |
| Chad | 15.19135077 |
| Channel Islands | 21.33904497 |
| Chile | 23.08370512 |
| China | 18.31697674 |
| Colombia | 20.08226703 |
| Comoros | 15.31598179 |
| Congo, Dem. Rep. | 16.04903985 |
| Congo, Rep. | 17.21542642 |
| Costa Rica | 22.16244517 |
| Côte d'Ivoire | 13.82831437 |
| Croatia | 18.15915446 |
| Cuba | 21.71070667 |
| Curacao | 20.87157584 |
| Cyprus | 20.439 |
| Czech Republic | 19.3440864 |
| Denmark | 21.26518516 |
| Djibouti | 16.85174319 |
| Dominican Republic | 20.35 |
| Ecuador | 21.74562548 |
| Egypt, Arab Rep. | 16.04881398 |
| El Salvador | 20.14456688 |
| Equatorial Guinea | 16.26078119 |
| Eritrea | 13.67399807 |
| Estonia | 17.86699549 |
| Ethiopia | 17.12255292 |
| Fiji | 15.30985199 |
| Finland | 21.61828403 |
| France | 22.8849112 |
| French Polynesia | 18.87428571 |
| Gabon | 17.65431268 |
| Gambia, The | 14.66818684 |
| Georgia | 17.50436221 |
| Germany | 21.59484033 |
| Ghana | 15.03108857 |
| Greece | 21.50597568 |
| Grenada | 17.533 |
| Guatemala | 20.25 |
| Guinea | 14.71146345 |
| Guinea-Bissau | 14.49996566 |
| Guyana | 15.41958781 |
| Haiti | 16.8919561 |
| Honduras | 20.7024131 |
| Hong Kong SAR, China | 23.4465927 |
| Hungary | 17.53246155 |
| Iceland | 23.40023029 |
| India | 16.9656016 |
| Indonesia | 15.24539784 |
| Iran, Islamic Rep. | 19.10934104 |
| Iraq | 16.21103953 |
| Ireland | 21.71968539 |
| Israel | 23.2299183 |
| Italy | 22.96345322 |
| Jamaica | 20.98352872 |
| Japan | 23.00051736 |
| Jordan | 17.82363367 |
| Kazakhstan | 14.37725052 |
| Kenya | 17.06496504 |
| Kiribati | 15.51971406 |
| Korea, Dem. Rep. | 13.67356388 |
| Korea, Rep. | 21.54577543 |
| Kuwait | 17.3768129 |
| Kyrgyz Republic | 15.50394516 |
| Lao PDR | 15.7548778 |
| Latvia | 16.44507705 |
| Lebanon | 20.41151655 |
| Lesotho | 14.49359747 |
| Liberia | 14.83724382 |
| Libya | 16.84017931 |
| Lithuania | 15.43306498 |
| Luxembourg | 21.93722124 |
| Macao SAR, China | 21.32681065 |
| Macedonia, FYR | 17.65450549 |
| Madagascar | 16.21158359 |
| Malawi | 17.5731862 |
| Malaysia | 18.42885311 |
| Mali | 15.13622886 |
| Malta | 21.45964223 |
| Mauritania | 15.75138266 |
| Mauritius | 18.02413872 |
| Mexico | 21.63684651 |
| Micronesia, Fed. Sts. | 16.49727494 |
| Moldova | 14.75324198 |
| Mongolia | 16.00334512 |
| Montenegro | 18.38541401 |
| Morocco | 18.50847194 |
| Mozambique | 16.17336358 |
| Myanmar | 15.66978051 |
| Namibia | 15.89000271 |
| Nepal | 16.4180858 |
| Netherlands | 21.98927558 |
| New Caledonia | 18.31726195 |
| New Zealand | 23.17391459 |
| Nicaragua | 21.02007424 |
| Niger | 15.49138068 |
| Nigeria | 13.44987484 |
| Norway | 22.22320326 |
| Oman | 19.33726945 |
| Pakistan | 17.54783994 |
| Panama | 22.51406807 |
| Papua New Guinea | 13.25806174 |
| Paraguay | 19.95 |
| Peru | 19.76229447 |
| Philippines | 15.10498206 |
| Poland | 18.74890428 |
| Portugal | 21.52707508 |
| Puerto Rico | 21.063 |
| Qatar | 20.51234485 |
| Romania | 17.59342186 |
| Russian Federation | 15.18871585 |
| Rwanda | 17.12063203 |
| Samoa | 16.41267346 |
| Sao Tome and Principe | 17.4937002 |
| Saudi Arabia | 17.44219828 |
| Senegal | 15.70905268 |
| Seychelles | 16.87 |
| Sierra Leone | 12.97044209 |
| Singapore | 22.47227363 |
| Slovak Republic | 17.71368682 |
| Slovenia | 20.59572097 |
| Solomon Islands | 16.11808374 |
| Somalia | 15.5408997 |
| South Africa | 13.46960398 |
| South Sudan | 15.85737537 |
| Spain | 22.48073797 |

APPENDIX 2: LIFE EXPECTANCY AT AGE 60 IN YEARS IN VARIOUS COUNTRIES (2012):

## Appendix B: Life Expectancy at Age 60 in Years in Various Countries (2012): Continues

| | |
|---|---|
| Sri Lanka | 19.08707558 |
| St. Lucia | 19.216 |
| St. Vincent and the Grenadines | 18.936 |
| Sudan | 17.16787878 |
| Suriname | 16.73581447 |
| Swaziland | 15.30302175 |
| Sweden | 22.82185614 |
| Switzerland | 23.20148223 |
| Syrian Arab Republic | 16.76535657 |

| | |
|---|---|
| Tajikistan | 16.24997503 |
| Tanzania | 17.84160622 |
| Thailand | 20.02643495 |
| Timor-Leste | 16.07731674 |
| Togo | 14.65113008 |
| Tonga | 16.22360241 |
| Trinidad and Tobago | 16.095 |
| Tunisia | 17.74390866 |
| Turkey | 18.63381512 |
| Turkmenistan | 14.96149135 |

| | |
|---|---|
| Uganda | 16.61869939 |
| Ukraine | 15.21567048 |
| United Arab Emirates | 19.47924539 |
| United Kingdom | 22.0530005 |
| United States | 21.76293193 |
| Uruguay | 19.03719554 |
| Uzbekistan | 16.56706123 |
| Vanuatu | 16.88765505 |
| Venezuela, RB | 18.57821146 |

| | |
|---|---|
| Vietnam | 19.29858024 |
| Virgin Islands (U.S.) | 20.43327203 |
| West Bank and Gaza | 17.22202026 |
| Yemen, Rep. | 15.40900179 |
| Zambia | 16.99272704 |
| Zimbabwe | 16.8021075 |

## Appendix C: Out of School Students in the Arab World

| Series | 2011 | 2012 | 2013 |
|---|---|---|---|
| Out-of-school children of primary school age, both sexes (number)-(A)* | 6,240,621 | 5,955,474 | 6,461,655 |
| Population of the official age for primary education, both sexes (number)-(B)** | 42,640,448 | 43,149,752 | 43,685,936 |
| Population, total- (C)*** | 355,137,048 | 362,466,629 | 369,761,523 |

Data Definitions:

* A: Children in the official primary school age range who are not enrolled in either primary or secondary schools. Source: UNESCO Institute for Statistics.

** B: Population of the age-group theoretically corresponding to primary education as indicated by theoretical entrance age and duration. UNESCO Institute for Statistics.

*** C: Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. The values shown are midyear estimates. Sources: United Nations Population Division. World Population Prospects, United Nations Statistical Division. Population and Vital Statistics Report (various years), Census reports and other statistical publications from national statistical offices, Eurostat: Demographic Statistics, Secretariat of the Pacific Community: Statistics and Demography Programme, and U.S. Census Bureau: International Database.

*The Journal of Business Inquiry* 2017, 16, Issue 1 (Special Issue), 12-35
http:www.uvu.edu/woodbury/jbi/articles/
ISSN 2155-4072

# Asymmetry in Stock Market Reactions to Changes in Membership of the Dow Jones Sustainability Index

*By* SATISH JOSHI, VIVEK PANDEY, AND ROBERT B. ROSS*

*This article empirically explores investors' response to firm sustainability efforts as evidenced by inclusion or exclusion from the Dow Jones Sustainability Index (DJSI) using the event study method. The DJSI selection process is posited to mimic a relative performance evaluation tournament generating an incremental amplified sustainability valuation signal. While the extant literature has treated effects of DJSI additions and deletions as being theoretically symmetrical but opposite in direction, we hypothesize that expectation of such opposing symmetry of response is unwarranted. Deletion from the DJSI is conditional on initial inclusion in the DJSI, and investors are therefore likely to perceive deletion as an indicator of a failed strategy or investment and react non-positively. The results suggest that markets on average reacted negatively to DJSI inclusion and non-positively to exclusion as hypothesized, and corporate social responsibility leadership by highly leveraged firms is viewed less favorably.*

**Keywords**: Corporate Social Responsibility, Event Study, Sustainability Index, Stock Market Reaction, Value Relevance

JEL Classification: M14, G14, M40

## I. Introduction

Sustainability, triple bottom line performance, and corporate social responsibility (CSR) are commonly found terms in company annual reports, mission statements, and CEO talks, reflecting the growing importance of these concepts to corporate strategy. In a survey conducted by the Massachusetts Institute of Technology and the Boston Consulting Group, 70 percent of firms reported that sustainability was on their top management agenda, and 67 percent responded that sustainability was critically important to being competitive (Kiron *et al*., 2012). Another study found that about 80 percent of responding investors had considered sustainability concepts in one or more contexts within the past year (PWC, 2014). Sustainable, responsible, and impact investing (SRI) is growing rapidly; the total U.S.-domiciled assets under management using SRI strategies expanded from less than $0.3 trillion in 1995 to $6.57 trillion at the start of 2014, accounting for one sixth of professionally managed investments (US-SIF, 2015). Given the considerable interest in sustainability issues, a key question that arises is how stock markets perceive and respond to such sustainability efforts by corporations.

* Satish Joshi, corresponding author, Department of Agricultural, Food, and Resource Economics, Michigan State University, East Lansing, MI 48824-1039. Phone: (517) 353-8628. Email: satish@msu.edu. Vivek Pandey, Department of Economics, Institute of Rural Management Anand, Gujarat 388001, India. Phone: (+91) 846-948-4734. Email: vivek@irma.ac.in. Robert B. Ross, Department of Agricultural, Food, and Resource Economics, Michigan State University, East Lansing, MI 48824-1039. Phone: (517) 355-2266. Email: rross@msu.edu.

We explore the value relevance of sustainability disclosures by empirically analyzing stock market reactions to a firm's inclusion in or exclusion from the Dow Jones Sustainability Index (DJSI). We focus on the DJSI because inclusion in the DJSI is based on a comprehensive sustainability performance evaluation that draws on multiple sources of information. Only the top performing 'best in class' firms in their industry sectors are included in the DJSI. Therefore, we consider DJSI inclusion as an informative relative performance indicator of a firm's sustainability leadership. To assess the value relevance of changes in sustainability leadership, we analyze stock market price responses to announcements about DJSI changes (196 additions and 133 deletions) during the period 2002-2011, using the event study method.

A large body of extant literature has analyzed stock market reactions to firm additions to and deletions from indices such as the S&P 500 Index. A few recent articles have specifically analyzed stock market reactions to DJSI inclusions and exclusions using the event study method (Hawn *et al*., 2014; Oberndorfer *et al*., 2013; Cheung and Roca, 2013; Hawn *et al.*, 2013; Lackmann *et al.*, 2012; Cheung, 2011; Robinson *et al.*, 2011; Consolandi *et al*., 2009). These studies test hypotheses about the average directional effect of DJSI inclusion/exclusion by estimating the cumulative abnormal return (CAR) in the event window, where the event of interest is the announcement of DJSI changes. However, the findings are not unequivocal; reported results range from positive or statistically insignificant to negative CARs in response to inclusion in the DJSI depending on the study period and geographical coverage. Even within a single study, both the direction and magnitude of reported CARs are sensitive to the choice and the length of the event window. (See Table 1 for a summary). For example, Oberndorfer *et al.* (2013) and Cheung and Roca (2013) report negative market reactions to DJSI inclusions, but Lackmann *et al.* (2012), and Consolandi *et al.* (2009) report generally positive reactions, while Cheung (2011) and Karlsson and Chakarova (2008) report either mixed or statistically insignificant reactions. Index deletions generally result in either negative or statistically insignificant market reactions in these studies.

Our analysis differs from these prior studies in a number of ways. Theoretically, we posit that the DJSI selection process mimics a relative performance evaluation tournament, and as a result should create amplified valuation signals for the winners, i.e. firms that are ultimately included in the DJSI. Extant literature has treated effects of DJSI additions and deletions as being theoretically symmetrical but opposite in direction; i.e. if addition to the DJSI is value adding and results in positive CARs, then deletions from the DJSI should be value destroying resulting in negative CARs and vice versa. We argue that expectation of such opposing symmetry of response is unwarranted, because deletion from the DJSI is conditional on initial inclusion in the DJSI and hence addition and deletion events are not equivalent. Once a firm has been added to the DJSI, it has already incurred the costs of attaining the 'sustainability' reputation, and expected future costs and benefits of such sustainability leadership are incorporated into stock prices at the time. When such a firm is subsequently deleted from the DJSI, it will not be able to reap the potential future benefits from these prior reputation investments any more, and they become sunk costs. As a result, investors perceive deletion mostly as an indicator of a failed strategy or investment. Hence the stock market will negatively react to DJSI deletions regardless of their reaction to initial inclusion in the DJSI. In other words, while in consonance with prior literature we hypothesize that initial inclusion in the DJSI may have either positive or negative effects on firm returns (or CAR), we posit that subsequent deletion from the DJSI will always have a non-positive effect on stock returns. This novel theoretical insight helps to reconcile apparently inconsistent findings in prior studies.

**Table 1: Summary of Main Results from Prior Event Studies of DJSI Status Change**

| Study | Index/geographical /temporal coverage | Event window | CAR for DJSI Addition | CAR for DJSI Deletion |
|---|---|---|---|---|
| Oberndorfer *et al*., 2013 | German firms added to DJSI-STOXX and DJSI World (1999-2002) | AD or ED whichever is earlier. (0, +5) | Negative | NA |
| Cheung and Roca, 2013 | DJS World Index-stocks listed in 9 Asia-Pacific countries (2002-10) | AD-15 to AD, AD to ED, ED+1 to ED+30 | Usually negative and significant | Mixed: positive (ED windows) and negative (AD windows) and negative for longer windows |
| Lackmann *et al*., 2012 | DJSI-STOXX, Europe (2001-08) | AD (-2,+2), (-5,+5) , (-10, +10) | Positive and significant for all windows | No significant effect |
| Cheung, 2011* | US firm inclusion/exclusion from DJSI World (2002-2008) | Various AD, AD+4, ED, ED+4 and a long AD-15 to CD+60 | Mixed, not significant except two specific days ED(-ve), ED+2 (+) | Mixed, not significant, except CD+1 (-ve) |
| Robinson *et al*., 2011 | DJSI-North America (2003-07) | AD to ED-1, ED to ED+60 | Negative (not-significant) for AD to ED-1; and positive for ED to ED+60 | Not significant |
| Consolandi *et al*., 2009 | DJStoxx 600 and DJSI within DJStoxx 600, (2002-06) | Various, covering AD-10 to ED+10 | Positive for [AD+1 to ED-1], [AD-10, ED+10] | Not significant for short windows; but negative for longer windows [AD-10 to ED+10] |
| Karlsson and Chakarova, 2008 | Nine country firm inclusions/exclusions from DJSI World (2002-2006) | AD | No statistically significant effect | No statistically significant effect |

AD= Announcement date, ED=Effective date.
***** Cheung (2011) refers to the effective date as change date (CD), but for consistency we rename his CD as ED.

Finally, our definition of the event is more nuanced compared to previous studies. We differentiate between the initial announcement date (AD), the effective date (ED) on which the changes in the DJSI become effective, and the actual day (AcD) on which the information about a particular firm becomes publicly available. We define the event as the day on which the information on addition/deletion becomes publicly available for the first time, which is more appropriate and accurate. Our approach helps to narrow the event window, unlike prior studies which have typically chosen longer event windows because of the long lag between the announcement date and effective date. It is well understood that longer event windows reduce the reliability of results because of other potential confounding events (MacKinlay, 1997; McWilliams and Siegel, 1997). Our study thus contributes to this literature by addressing the limitations of extant studies, presenting new theoretical insights that help reconcile conflicting results in prior studies, and providing supporting empirical analyses.

## II. Background and Hypotheses

### *A. Value Relevance of Sustainability Performance*

Discourse on whether firms should engage in CSR activities, and if and how sustainability efforts can add to firm value, has a long history. For example, Bowen (1953) argued that businessmen have obligations to pursue policies, decisions, and lines of action which are desirable in terms of the objectives and values of society, while Friedman (1970) suggested that the only social responsibility of business is to maximize shareholder wealth, subject to explicit compliance with extant laws and regulations. Others have suggested that there is no inherent conflict between shareholder wealth maximization and social responsibility because businesses stand to gain in the long run from their social responsibility (Davis, 1960). Beginning with Porter's (1991) contention that firms can be both 'green and competitive' by engaging in pollution prevention and efficiency improvement supported by smart regulations, researchers have identified a number of mechanisms through which sustainability efforts can contribute to improving firm value and shareholder wealth which draw on neo-classical economics, instrumental stakeholder theory, resource based view (RBV), and institutional theory. These include: CSR leads to reduced regulatory enforcement and lower costs of compliance relative to rivals; pollution reduction lowers environmental risks and contingent liabilities; CSR helps product differentiation and higher willingness to pay by the growing green consumer market segments due to "moral reputation capital"; CSR provides preferential access to scarce unique resources and assures sustainability of resources in the long run; stakeholder engagement provides legitimacy and reduces the risk of adverse social reactions to firm initiatives; it lowers the cost of capital by signaling long term viability and attracting socially conscious investors; improved CSR reputation attracts better employees and lowers employee turnover; and motivated efforts to address big societal issues enable sustained innovation and growth (Hart, 2005; Porter and Kramer, 2006; Orlitzky, 2008; Dhaliwal, *et al.*, 2011, Wang *et al.*, 2015). Porter and Kramer (2011) propose the concept of sustainability as a shared value creation process that can enhance the competitiveness of a company and unlock the next wave of business innovation and growth while simultaneously advancing the economic and social conditions of the communities in which it operates. The key message of this stream of literature is that firm value is positively associated with firm sustainability performance and strategy.

At the same time, researchers have also identified pathways by which CSR can adversely affect financial performance. For example, firms may make suboptimal choices because of additional constraints imposed by sustainability considerations on firm production technology; competitive disadvantage may result from CSR demands for regulatory over-compliance and higher costs; lost productivity may occur because of diversion of resources and managerial attention; managers may engage in CSR activities to further their personal agenda and reputation at the cost of investors. CSR may encourage unproductive ceremonial institutional practices decoupled from operational requirements; and CSR activities may result in corporate charity serving the interests of stakeholders at the cost of shareholders (Jaffe *et al.*, 1995; Waddock and Graves, 1997; Cheung and Roca 2013, Lys *et al.*, 2015).

Given the ambivalence of the theoretical predictions, a large number of studies have simply used a positive theory approach and empirically examined the relationship between corporate sustainability performance (CSP) and financial performance (FP). Orlitzky (2008) provides a review and synthesis of this literature and reports mixed results. Margolis *et al.* (2009) analyze 251 prior CSP/FP studies and find that 59 percent of these studies reported a non-significant

relationship, 28 percent a positive relationship, and 2 percent a negative relationship between CSP and FP. Allouche and Laroche (2005) review 82 prior studies and report that although 75 studies reported a positive association, a statistically significant positive effect was found only in 50 percent of them. Statistical meta-analysis of 42 studies by Wang *et al*. (2015) indicates an overall positive relationship between CSP and FP.

The mixed empirical findings have been attributed to several theoretical and empirical difficulties, such as defining reliable and consistent measures of CSP, controlling for macroeconomic, industry, and firm specific moderator and mediating factors, and incorporating delayed/nonlinear effects of CSP on FP. Understandably results vary depending on the measures of FP and CSP used, and the adequacy of control variables. Financial performance indicators used in these studies are relatively straightforward and include either accounting measures (e.g., return on assets, return on equity) or market measures (e.g., stock returns, market/book value ratio). We posit that stock market movements are likely to provide a better summary measure of expected future performance compared to past, period based accounting measures such as ROI and ROE because stock prices are forward looking, and, in efficient markets, incorporate all the available information about expected future cash flows of the firm.

Because CSP is a complex multidimensional construct, developing satisfactory CSP measures is a major challenge. Margolis *et al.* (2009) discuss two main strategies used in empirical operationalization of CSP, first based on dimensions of CSP (e.g. corporate policies, disclosure, environmental emissions, philanthropic donations, and misdeeds), and the second based on the source of CSP appraisal (e.g. self-reports, observer perceptions, third party audit ratings). CSR dimensions suggested by others include measures of principles, processes, responsiveness, and outcomes (Carroll, 1979; Wood, 1991; Wartick and Cochran, 1985). Many organizations such as the Global Reporting Initiative (GRI), the International Standards Organization (ISO) through their ISO 14000 and ISO 26000 series of standards, the Investor Responsibility Research Center (IRRC), the Sustainability Accounting Standards Board (SASB), and Kinder, Lydenberg, Domini Inc. (KLD) have invested significant efforts in identifying key performance metrics and developing aggregate indices that enable reliable and consistent assessment and disclosure of corporate sustainability performance that can be compared across firms and over time. For example, GRI recommends sustainability disclosures covering economic, environmental, and social dimensions that include direct and indirect economic impacts, materials, energy and emission information, labor practices, human rights, societal impacts, and product responsibility. Moreover, because relevant performance metrics are likely to vary significantly across industries, GRI is developing sector specific guidance documents. In contrast, ISO standards are primarily process focused, and KLD ratings are based on evaluations of strengths and areas of concern. Most of the ‘socially responsible’ mutual funds tend to use relatively simple environmental, safety, and governance (ESG) screening criteria to decide on which firms to exclude from their portfolios.

### *B. Relative Performance Appraisal and Tournaments*

An investor who views CSR as a long term sustainable value creation proposition and wants the firm management to invest in CSP faces two key uncertainties. First, there is imperfect information arising from difficulties in measuring sustainability performance combined with unobservable managerial effort toward meeting sustainability goals. Second, the ultimate sustainability performance, however measured, depends not only on a firm's strategy and activities, i.e. managerial effort, but also on external circumstances, macroeconomic and sector specific market conditions, stakeholder reactions, and the broader socio-political environment. From an investor's perspective therefore, a firm's sustainability performance is characterized by both high environmental uncertainty and imperfect information. Economic theory suggests that under circumstances characterized by these attributes, relative performance appraisal and rank order tournaments can facilitate better performance. The intuition is that relative performance appraisal controls for common uncertainty in the environment, while tournament schemes where the rewards are based mainly on the relative rank, incentivize managers (firms) to overcome risk aversion and adopt more 'profitable' production techniques (Lazear and Rosen, 1981; Green and Stokey, 1983; Nalebuff and Stiglitz, 1983; Holmstrom, 1982).

Rosen (1986) seeks to theoretically explain relatively large rewards for top ranks in tournaments. For example, it is commonly observed that the top four semifinalists receive more than 50 percent of the total purse in premier tennis tournaments. He analytically shows that an elimination tournament design requires an extra reward for the overall winner in order to maintain performance incentives throughout the game. The intuition of this result is that a competitor's performance incentives at any stage are set by an option value; while the loser's prize is guaranteed at that stage, winning gives the option to continue on to all successive stages of the tournament. The difference in prize money between winning and losing must incorporate the equivalent of the survival option that maintained incentives at earlier stages. The large reward at the top arises from the no-tomorrow aspects of the final stage of the game where all options expire. In other words, Rosen (1986) suggests that large top-ranking prizes are required to incentivize competitors to aspire to higher goals independent of achievements in the previous rounds of the tournament. If top prizes are not large enough, those who have succeeded in achieving somewhat higher ranks (or won previous rounds) can rest on their laurels and slack off in their attempts to climb higher.

In the next section, we briefly describe the process used by Dow Jones to select firms for inclusion in the DJSI, and then suggest that the selection process mimics a relative sustainability performance based tournament, where the winning firm is rewarded with inclusion in the DJSI. Investors reward firms who win such CSP contests by "voting with their feet," by their higher willingness to pay for the stocks of winning firms, thereby increasing their stock prices. This mechanism also has the added benefit of indirectly rewarding managers who have traditional stock price based incentive compensation contracts. On the other hand, if investors perceive that CSR efforts do not create value, they can reduce their holdings of stocks of firms winning such CSP contests, which is equivalent to penalizing the worst performers in traditional tournament based compensation schemes.

We hypothesize that winning such CSP contests will have information value over and above (i.e. incremental to) other firm-specific CSP indicators because of the relative performance appraisal aspect. Further, drawing on the model results from Rosen (1986), we postulate that stock market reaction to such winning will provide an amplified signal of investor valuation of CSR,

because in order to maintain appropriate incentives, the winners of such CSP contests must receive extra rewards that represent expired option values of earlier stages.

### *C. Dow Jones Sustainability Index*

The DJSI is administered by the Sustainability Asset Management (SAM), a Zurich-based fund management firm that devised the idea for the DJSI. SAM is also responsible for the selection process. Firms are selected for inclusion in the DJSI from the population of firms in the Dow Jones Global Total Stock Market (DJGTSM) index consisting of the largest 2,500 companies by free-float market capitalization. DJSI firms come from 18 different sectors. For selecting firms, SAM conducts comprehensive corporate sustainability assessments drawing on four sources of information:

1) Company Questionnaires: Companies that wish to be considered for index membership fill out a detailed questionnaire signed by a senior company representative. The questionnaire has weighted questions on economic, social, and environmental factors that cover both generic and industry specific topics (DJSI, 2011).

2) Company Documentation: Documents requested from companies include sustainability reports, environmental reports, health and safety reports, social reports, annual financial reports, special reports (e.g., reports on corporate governance, R&D, employee relations, etc.), and all other sources of company information ( e.g., internal documentation, brochures, and website).

3) Media and Stakeholder Analysis (MSA): SAM uses MSA to identify and assess issues that may present financial, reputational, and compliance risks to the assessed companies. SAM makes use of media coverage, stakeholder commentaries, and other publicly accessible sources.

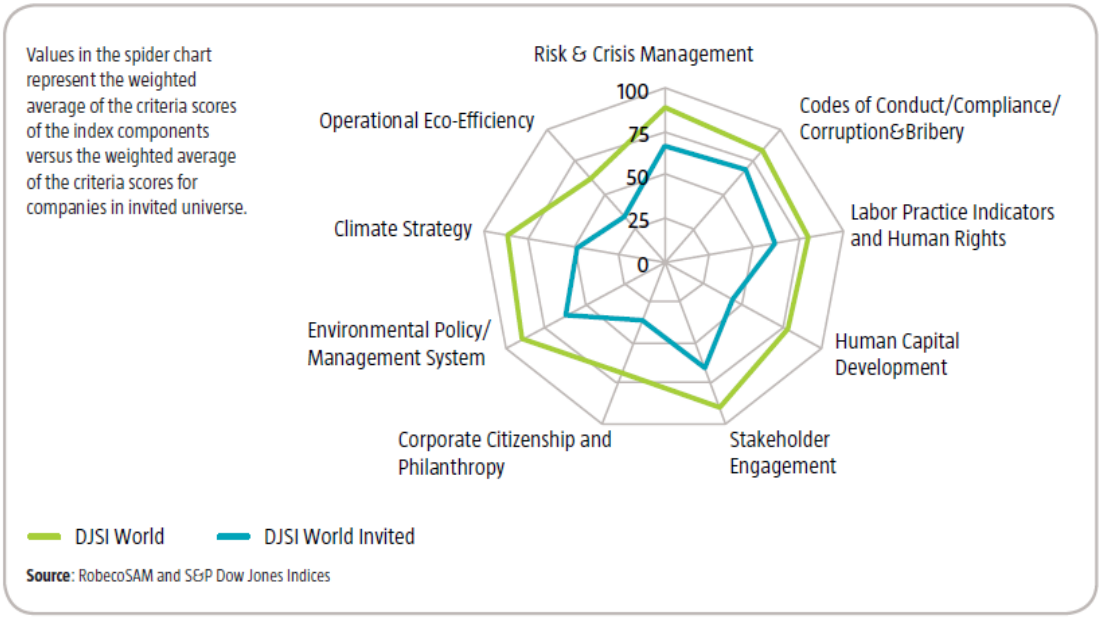
4) Contact with Companies: SAM analysts personally contact individual companies to clarify open points that may arise during analysis of the MSA, questionnaire, and company documents.

The questions and evaluation criteria are based on widely accepted standards, best practices, and audit procedures, as well as input from industry specialists and consultants. The results based on these analyses are then subjected to an external and internal audit, after which a corporate Total Sustainability Score (TSS) is calculated for each company. Only the companies that are sustainability leaders, i.e. judged to be in the top 10 percent in their industry in terms of sustainability performance, are included in the DJSI. The process is repeated annually, and firms that fail to remain in the top 10 percent are deleted from the index.

We contend that the selection process of the DJSI quintessentially mimics a tournament based on relative performance, where the winner-takes-all prize is firm inclusion in the index. The selection process has several stages; the initial selection into the DJGTSM is based on market capitalization; only select firms from the DJGSTM are then invited to the next stage of completing the SAM questionnaires, which have industry specific questions. These responses determine which companies are then selected next for more in depth analyses and investigation. Finally, winners

who belong to the top 10 percent in each industry are included in the DJSI. For instance, a total of 3,300 firms were invited in 2013 for potential evaluation for inclusion in the DJSI, out of which 1,831 were chosen for further analyses, and only 80 companies were included in the final DJSI World Index. Figure 1 shows the average sustainability scores of the invited universe and the final winners that were included the DJSI World Index.

**Figure 1: Comparison of the Sustainability Profile of the DJSI World Versus the Invited Universe, 2013**




Source: DJSI Family, RobecoSAM, 2013.

Only the winners are disclosed without revealing individual company scores or overall rankings. The industry specific relative sustainability scoring controls for common systemic environmental uncertainty and the winner takes all feature mimic the incentive structure of a tournament. As a result, drawing on Rosen's model which predicts extra rewards for the winner of a tournament, we posit that stock market reactions to inclusion/exclusion from the DJSI provide an incremental amplified signal of investor perception of the value of CSP. While we hypothesize an amplified signal of investor perception, understandably we do not attempt to estimate the degree of amplification as there are no reliable empirical measures of the actual baseline average value of CSP.

In addition to the tournament effect, the increased awareness and monitoring effect due to winning such a tournament would also amplify market reactions. For example, if sustainability leadership is perceived to be value enhancing, inclusion in the DJSI would lead to increased scrutiny and monitoring of management by analysts and investors; and in turn management would respond with greater effort, leading to better future performance expectations; stock price movements will incorporate this indirect effect. On the other hand, winning the sustainability tournament may also be perceived as attracting increased scrutiny from other stakeholders and civil society organizations, and such increased monitoring may lead to 'over-commitment' to

environmental and social goals at the cost of shareholders, thereby amplifying the negative reactions.

Therefore, we propose the following hypothesis.

H1. *Firms added to the DJSI experience a non-zero change in their stock prices*

The direction of the change in stock prices will then reveal whether investors consider CSP to be value adding or not.

### *D. Firm Capital Structure and Sustainability Performance*

While shareholders and bondholders both benefit from a rise in firm value, Black and Scholes (1973) show that when a firm makes riskier investments, shareholders may benefit at the expense of bondholders because stocks are analogous to call options (implicitly sold by the bondholders) on the underlying firm value. In other words, if investments in CSR are riskier, the changes in stock returns may just indicate the effect of a wealth transfer from bondholders to shareholders, and not necessarily be of benefit to the entire firm value, i.e., the sum of stock and debt values. Jensen and Meckling (1976) discuss moral hazard problems of risky investments when firms are financed by both debt and equity, and how these can be mitigated by the inclusion of various debt covenants in the indenture provisions, to control managerial behavior and to protect bondholders. However, Jensen and Meckling (1976) also recognize these covenants may limit management's ability to take optimal actions on certain issues and lower overall profitability, as the costs involved in writing such provisions and the costs of enforcing them would likely be non-trivial. Highly leveraged firms are likely to have more bondholder protections in the form of more stringent debt covenants that limit managerial action. Since investments in sustainability leadership tend to be risky, we draw on this stream of literature and posit that the stock market reactions to DJSI inclusion/exclusion are moderated by firm capital structure (the debt/asset ratio) and propose the following hypothesis.

H2*: Firm leverage (debt/asset ratio) will have a significant moderating effect on stock price reactions to firm inclusion in the DJSI.*

The direction of the moderating effect will reveal the net consequence of the wealth transfer effect and countervailing debt covenant restrictions.

### *E. DJSI Deletions*

Extant literature has treated effects of DJSI addition and deletion as being theoretically symmetrical but opposite in direction, i.e. if addition to the DJSI is value adding and results in positive stock market response, then deletions from the DJSI should be value destroying, resulting in negative market responses and vice versa. Here we argue that expectation of such opposing symmetry of response is unjustifiable, because the event of deletion from the DJSI is conditional on initial inclusion in the DJSI. Once a firm has been added to the DJSI, it has already incurred the costs of attaining the 'sustainability' reputation, and expected future costs and benefits of such sustainability leadership are then incorporated into its stock price. When such a firm is

subsequently deleted from the DJSI, it will no longer be able to reap the potential future benefits from these prior reputation investments. These investments become sunk costs. Investors may hence perceive deletion as an indicator of a failed investment. Further, investors may also conclude that additional resources may be spent in damage control and trying to regain the reputation (i.e., getting back on the DJSI.) Hence we hypothesize that the stock market will negatively react to DJSI deletions. However, if the investors believe that the deletion is a temporary setback and expect the firm to get back on the DJSI without significant additional investments, the stock market reactions may not be strongly negative. In other words, while we hypothesize that initial inclusion in the DJSI may have either a positive or a negative effect on firm returns, we posit that subsequent deletion from the DJSI will always have a non-positive effect (i.e., either a negative or a statistically insignificant effect) on stock returns.

H3*: Firms deleted from the DJSI experience a non-positive change in their stock prices.*

H4*: Firms that were deleted but have a longer history as DJSI members, or history of getting back on the DJSI, and those which have no significant worsening in their absolute sustainability performance will face less negative (i.e., muted) stock market reactions.*

## III. Data and Methods

### *A. Event Study Method*

We employ the event study method to analyze stock market reactions to changes in the DJSI status of firms. Event studies analyze abnormal returns arising from informational events, which are estimated based on market models such as the one factor capital asset pricing model or multiple factor based Fama and French (1993) models (MacKinlay, 1997). A number of event studies have analyzed stock market reactions to firm additions to and deletions from indices such as the S&P 500 Index. Various hypotheses have been proposed to explain the price reactions that include downward sloping demand curves, price pressures, investor information/search costs, signaling, and liquidity changes (Cheung and Roca, 2013; Shleifer, 1986; Harris and Gurel, 1986; Merton, 1987; Denis *et al*., 2003; Dhillon and Johnson, 1991; Hegde and Mcdermott, 2003). As mentioned previously, a few recent studies have analyzed stock market reactions to DJSI inclusions and exclusions using the event study method, which are summarized in Table 1. While our basic approach is similar to these studies, the differences and refinements in our methods are explicated in the following sections.

### *B. Defining the Event, Event Window, and Estimation Window*

The events of interest are the annual announcements made by Dow Jones/SAM concerning the additions and deletions of the U.S. firms from the DJSI (World and North America) during the period from 2002 to 2011. There were a total of 196 addition and 133 deletion events in this period. These additions and deletions were based on a firm's relative sustainability performance. Changes in the DJSI's composition for other reasons, e.g., mergers, acquisitions, bankruptcy, etc., were announced separately during the quarterly updates to the index. The list of all the companies that were added to and deleted from the index was provided in a single announcement for years 2002 to 2005. However, post-2005, Dow Jones published a press release every September which only

listed the name of the top company from each sector and the total number of additions and deletions. The complete list was released on the date when the actual trading on the DJSI began. We define the date of the initial press release as the 'Announcement Date' (AD). The 'Effective Date' (ED) is the actual trading date when the new DJSI constituents started trading on the index. The time gap between the announcement and the effective date varied from 9 to 22 days. However, on the announcement day, all companies that had participated, received a mailing with the main results of their sustainability performance and were able to download their own scores/detailed results from a protected area. Many firms that had such private information about their inclusion into or exclusion from the DJSI, especially those firms that had been added to the DJSI, chose to disclose this information through their own press releases or announcements on their corporate websites before the effective date. In some cases, the information was leaked or revealed by newspapers. In other words, the information about the change in DJSI status could become publicly available either on the AD or on any day between the AD and the ED. We searched for all Dow Jones events since January 2002 on the LexisNexis Academic database to identify the earliest date on which the change of DJSI status of a firm became publicly available, which we label as the 'Actual date' (AcD).

Prior DJSI event studies recognize the AD and the ED and analyze stock market reactions with event windows defined around the AD or the ED (Robinson *et al.*, 2011; Cheung and Roca, 2013; Cheung, 2011; Detre and Gunderson, 2011) or a longer window that includes both the AD and the ED. For example, Robinson *et al*. (2011) and Cheung (2011) use a 60+ day event window and report significantly positive returns. However, it is well understood that longer event windows reduce the reliability of results because of other potential confounding events (McWillams and Siegel, 1997; McWillams *et al.*, 1999). Precise identification of the actual date on which the information about change in a firm's DJSI status first became publicly available is a key refinement in this study compared to prior DJSI event studies.

To demonstrate the difference the choice of event date makes, we choose different event windows around AD, ED, and AcD and present the results. However, we use estimates from the event windows around the more accurate actual date-AcD to test our hypotheses and to conduct additional analyses. We use an estimation period of 252 days preceding the event window for estimating the market models used for calculating the 'normal returns'. This choice is consistent with the estimation periods used in previous studies that range from 100 to 300 days (Peterson, 1989).

### *C. Estimation of Normal Return and Abnormal Return*

Following prior research (e.g., Fama *et al.*, 1969; Peterson, 1989; MacKinlay, 1997), we employ the market model to estimate the expected or normal returns of the DJSI firms. This estimate is then used to calculate abnormal returns. The market model of expected returns used for the estimation is:

$$R_{it} = \propto_i + \beta_i R_{mt} + \varepsilon_{it} \qquad (1)$$

Where $R_{it}$ is the return on security (firm) $i$ for period (day) $t$, $R_{mt}$ is the return on the benchmark market index for day $t$, $\varepsilon_{it}$ the error term is assumed to be distributed with mean zero and variance $\sigma_\epsilon^2$.

Given the estimated market model parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$, the abnormal return (AR) on event date *t* is :

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \quad (2)$$

Abnormal returns capture the excess returns an investor would have earned over an event day if he invested in security *i*. The assumption is that the abnormal returns are associated with the event of interest, namely new information about the DJSI status of the firm.

The cumulative abnormal return (CAR) during an event window $(\tau_1,\tau_2)$ is given by:

$$CAR_i(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} AR_{it} \quad (3)$$

We estimate the model (Equation 1) annually, for each of the 329 firms which were either added to or deleted from the DJSI during the period 2002 to 2011. Cumulative abnormal returns are calculated for different event windows around AD, ED, and AcD using an estimation window of 252 days prior to the event date.

Additionally, we also estimate normal and abnormal returns by employing the Fama and French (1993) three-factor model, and the four-factor model extension suggested by Carhart (1997) as the return generating processes. These results are discussed in detail in the section on additional analyses.

### *D. Hypotheses Testing*

In order to test hypothesis H1, i.e. inclusion in the DJSI has a non-zero effect on stock prices, and the hypothesis H3, i.e., firms deleted from the DJSI experience a non-positive change in their stock prices, we test the statistical significance of the mean CARs separately for the samples of firms that were included in the DJSI and those that were excluded from the DJSI.

Under the assumption that the disturbance terms are independent and identically distributed *(iid)* normal across the sample and over time, the hypothesis that the CARs are significantly different from zero can be tested using the Patell test (Patell, 1976). However, *iid* assumptions are violated if there is either cross-sectional or serial correlation or heteroscadasticity in the firm return processes from which the prediction errors are estimated. We employ the modified version of the Patell test to account for a potential serial correlation of abnormal returns in the event window (Patell, 1976; Mikkelson and Partch, 1988). Further, to account for potential event-induced increase in volatility, we employ the two-step-test procedure suggested by Boehmer *et al*. (1991) to derive an event-induced variance robust test-statistic (BMP) that is distributed Student-t with N-1 degrees of freedom. In addition, we also use the sign Z test, which is a nonparametric test commonly used in event studies. The sign test judges the proportion of positive and negative abnormal returns against an assumed 50 percent split under the null hypothesis that there is no reaction to the event. Additionally, the sign test helps to verify that the parametric findings do not result from a few outliers, as nonparametric tests are less sensitive to outliers (Cowan, 1992; Cowan 2007).[1]

[1] Corrado (1989) reports that another nonparametric test, the rank test, accords more power to detect abnormal stock price changes than standard parametric tests. However, Cowan's (1992) simulation studies present several weaknesses of the rank test compared to sign test that include: misspecification under thin trading conditions and increased event induced variance, relatively lower power especially in multiple day event windows, and sensitivity to extreme abnormal return for a single stock.

To test hypotheses H2 and H4, we estimate a regression equation of the general form

$$CAR_{it} = \delta_0 + \delta_1 * Lev_{it} + \delta_2(Z_{it}) + \varepsilon_{it} \quad (4)$$

Where $CAR_{it}$ is the cumulative abnormal return to stock of firm *i* for the event in year t, and $Lev_{it}$ is leverage (debt/equity ratio) of firm *i* in year t, and $Z_{it}$ is a vector of other explanatory and control variables. These regressions are estimated separately for the samples of firms that were included in the DJSI and those that were excluded. H2 predicts a nonzero coefficient $\delta_1$, which is then tested. H4 predicts statistically significant coefficients for variables relating to firm DJSI history included in $Z_{it}$.

## IV. Results

Tables 2, 3, and 4 present the results of the event studies in terms of cumulative abnormal returns where the event date is AD, ED, and AcD respectively. Panel A in each of these tables shows results for the firms that were added to the DJSI, while Panel B shows results for firms that were deleted from the DJSI. The CARs are reported for four different event windows. For example, (-1, +1) represents the CAR for the period from one day before the event date, to one day after the event. Table 4 reports the daily abnormal returns in addition to the results for the selected event windows for the AcD event date.

We can make the following observations from Tables 2-4. Comparing results in Panel A of each of the three tables indicates that the market generally reacts negatively to a firm's inclusion in the DJSI. Although the direction of the market reaction is similar, the magnitude and the statistical significance of CARs are sensitive to the choice of the event date. Both the absolute magnitude and the statistical significance of the average CARs are the lowest when announcement date is used as the event and the highest when the actual date is used. This observation is consistent with the way in which information about DJSI inclusions is released; information for only the top firms becomes available on announcement days, whereas information about other additions is released slowly through other means, and complete information about the entire list becomes public only on the effective day. As the market is likely to react most strongly when the information becomes publicly available for the first time, as expected, the market responses are larger and statistically most significant when the AcD is used as the event date. These results also support our initial conjecture that choosing an appropriate event date is important to assess the market effect of DJSI changes. This finding may also help explain the mixed and insignificant results reported in prior studies that used different or longer event windows.

From Table 4, Panel A, it can be observed that firms that were added to the DJSI had negative reactions beginning four days before the event and lost 0.41 percent on the event date, and had a CAR of -1.36 percent over the event window (-5, +2). There was some recovery on the third and fourth day after the event. These findings indicate that there was some information leakage and adjustment prior to the public availability of the information, and markets reacted relatively strongly and negatively on the event date. There was also some adjustment as the information was processed by market participants.

The results overall suggest that investors perceive a firm's addition to the DJSI and winning such sustainability leadership tournaments as shareholder value destroying. That is, considerations such as the potential additional constraints on production technology, over-compliance resulting in competitive disadvantage, and diversion of managerial attention and resources from productivity improvement overshadowed considerations of the potential avenues through which

sustainability efforts can add to firm value. Alternatively, investor planning horizons may be potentially too short, wherein a long term value proposition of sustainability leadership would be dwarfed by perceived short term costs and disadvantages.

**Table 2: Cumulative Abnormal Returns (CARs) for Announcement Date (AD) Event Study**

| **Panel A:** Index Inclusions (N=196) | | | | | | **Panel B:** Index Exclusions (N=133) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Window | Mean Returns (%) | Percentage Negative | Patell Z | BMP *t*-test | Sign Z | Mean Returns (%) | Percentage Negative | Patell Z | BMP *t*-test | Sign Z |
| CAR(-1,+1) | -0.36 | 56 | -1.45* | -1.76** | -1.25 | 0.22 | 52 | -0.14 | -0.15 | -0.07 |
| CAR(-2,+2) | -0.16 | 49 | -0.30 | -0.30 | -0.11 | 0.07 | 49 | -0.71 | -0.77 | -0.41 |
| CAR(-3,+3) | -0.12 | 48 | -0.12 | -0.13 | 0.32 | -0.16 | 53 | -0.48 | -0.52 | -0.41 |
| CAR(-5,+2) | -0.36 | 56 | -1.38* | -1.69** | -0.82 | -0.06 | 60 | -0.80 | -0.87 | -0.24 |

**Table 3: Cumulative Abnormal Returns (CARs) for Effective Date (ED) Event Study**

| **Panel A:** Index Inclusions (N=196) | | | | | | **Panel B:** Index Exclusions (N=133) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Window | Mean Returns (%) | Percentage Negative | Patell Z | BMP *t*-test | Sign Z | Mean Returns (%) | Percentage Negative | Patell Z | BMP *t*-test | Sign Z |
| CAR(-1,+1) | -0.52 | 61 | -3.37*** | -3.38*** | -2.67*** | 0.16 | 48 | -0.66 | -0.40 | 0.80 |
| CAR(-2,+2) | -0.76 | 58 | -3.21*** | -3.21*** | -1.96** | 0.21 | 50 | -0.43 | -0.31 | 0.28 |
| CAR(-3,+3) | -0.36 | 51 | -1.28 | -1.40* | 0.04 | -0.04 | 49 | -0.62 | -0.55 | 0.46 |
| CAR(-5,+2) | -0.97 | 61 | -3.19*** | -3.20*** | -2.67*** | -0.51 | 48 | -0.77 | -0.62 | 0.80 |

**Table 4: Abnormal Returns and Cumulative Abnormal Returns for Actual Date (AcD) Event Study**

| **Panel A:** Index Inclusions (N=196) | | | | | | **Panel B:** Index Exclusions (N=133) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Window | Mean Returns (%) | Percentage Negative | Patell Z | BMP *t*-test | Sign Z | Mean Returns (%) | Percentage Negative | Patell Z | BMP *t*-test | Sign Z |
| CAR(-1,+1) | -0.88 | 61 | -4.28*** | -4.42*** | -3.16*** | -0.08 | 52 | -0.86 | -0.56 | -0.11 |
| CAR(-2,+2) | -1.08 | 60 | -3.90*** | -3.83*** | -2.59*** | -0.32 | 52 | -1.27 | -1.02 | -0.11 |
| CAR(-3,+3) | -0.87 | 58 | -2.63*** | -2.74*** | -1.88** | -0.93 | 59 | -2.12** | -2.06** | -1.84** |
| CAR(-5,+2) | -1.36 | 62 | -3.88*** | -3.79*** | -3.16*** | -1.25 | 61 | -2.02** | -1.80* | -2.19** |
| AR(-4) | -0.06 | 56 | -0.98 | -0.87 | -1.16 | 0.03 | 49 | 0.28 | 0.24 | 0.58 |
| AR(-3) | -0.16 | 54 | -1.45* | -1.66** | -0.73 | -0.53 | 57 | -2.14** | -1.59 | -1.32 |
| AR(-2) | -0.05 | 51 | -0.52 | -0.43 | -0.01 | 0.17 | 52 | 0.20 | 0.18 | -0.11 |
| AR(-1) | -0.31 | 55 | -1.41* | -1.12 | -1.02 | 0.02 | 47 | -0.18 | -0.13 | 1.10 |
| AR(0) | -0.41 | 65 | -4.45*** | -4.10*** | -3.73*** | 0.00 | 56 | -0.47 | -0.39 | -1.15 |
| AR(1) | -0.16 | 60 | -1.54* | -1.87** | -2.45*** | -0.10 | 49 | -0.81 | -0.72 | 0.58 |
| AR(2) | -0.15 | 52 | -1.85** | -1.56* | -0.16 | -0.40 | 57 | -1.57 | -1.22 | -1.32 |
| AR(3) | 0.38 | 45 | 3.38*** | 2.83*** | 1.70** | -0.09 | 53 | -0.61 | -0.61 | -0.46 |
| AR(4) | 0.25 | 45 | 1.97** | 1.63* | 1.55* | -0.01 | 50 | -0.08 | -0.06 | 0.23 |

### *A. Factors Influencing CAR in Index Inclusions*

Hypothesis H2 posits that firm leverage (debt/asset ratio) will have a significant moderating effect on stock price reactions to a firm's inclusion in the DJSI.

To test this hypothesis, we first estimate separate regression equations with the CAR for the event windows (-1, +1) and (-2,+5) as the dependent variables for the sample of all DJSI inclusion firms. The shorter window (-1, +1) is used to measure immediate short term response, while the longer window (-5,+2) is expected to capture potential information leakage and slow dissemination effects. The estimated equation is of the form:

$$CAR_{it} = \delta_0 + \delta_1 * Debt/Asset_{it} + \delta_z(Z_{it}) + \varepsilon_{it} \quad (5)$$

Where *Debt/Asset* is the debt to asset ratio for the firm and $Z_{it}$ are other explanatory/control variables, that include firm specific factors like size *(log(asset))*, profitability *(ROA)*, capital efficiency (*asset turnover* ratio), international operations (*international-ops* measured as share of total taxes paid abroad), number of years the firm was in the DJSI previously (*DJSI years*), and industry controls (*Industry1*, a dummy variable that takes the value 1 if the firm belongs to pollution intensive industries such as chemicals, fuels, and basic materials, and *Industry2* is a dummy variable if the firm was directly marketing to consumers). We also include a time trend variable (*Trend*) to see if the market response to DJSI inclusion had systematically changed over time. The estimated results are shown in Panel A of Table 5.

**Table 5: Robust Regression with CAR as Dependent Variable - Without KLD Variables**

| Dependent Variable | **Panel A:** DJSI Inclusions (N=193) | | | | **Panel B:** DJSI Exclusions (N=129) | | | |
|---|---|---|---|---|---|---|---|---|
| | CAR(-1,+1) | | CAR(-5,+2) | | CAR(-1,+1) | | CAR(-5,+2) | |
| Exp Variable↓ | Coeff | *t*-stat | Coeff | *t*-stat | Coeff | *t*-stat | Coeff | *t*-stat |
| Debt/Asset | -0.0347 | -2.77*** | -0.0339 | -2.26** | -0.0110 | -0.95 | -0.0200 | -1.43 |
| Log (asset) | -0.0009 | -0.50 | -.0031 | -1.57 | -0.0041 | -1.94* | -0.0005 | -0.21 |
| ROA | 0.00030 | 0.01 | -0.0009 | -0.02 | -0.0282 | -0.96 | -0.0355 | -1.00 |
| Trend | 0.0020 | 2.18** | 0.0029 | 2.71*** | -0.0003 | -0.30 | 0.0010 | 0.77 |
| DJSI years | 0.00037 | 0.33 | 0.0004 | 0.31 | 0.0072 | 1.11 | 0.0057 | 0.73 |
| Industry1 | -0.0099 | -1.23 | -0.0385 | -3.99*** | -0.0022 | -0.20 | -0.0113 | -0.84 |
| Industry2 | -0.0007 | 0.11 | -0.0120 | -1.59 | -0.0104 | -1.20 | -0.0109 | -1.05 |
| Asset-turnover | 0.0008 | 0.33 | -0.0012 | -0.42 | -0.0029 | -0.94 | -0.0036 | -0.94 |
| International ops | -0.0018 | 0.57 | -0.0018 | 0.48 | 0.0116 | 0.59 | 0.0130 | 0.55 |
| FirstTimeDeleted | | | | | -0.0033 | -0.26 | -0.0055 | -0.35 |
| FTD*DJSI years | | | | | -0.0054 | -0.81 | -0.0029 | -0.36 |
| Constant | -0.0008 | -0.04 | 0.0266 | 1.13 | 0.0468 | 1.72* | 0.0077 | 0.24 |
| Overall F stat | 1.87* | | 3.76*** | | 1.21 | | 1.09 | |

***=P<0.01, **=P<0.0 5, *=P<0.1.

As shown, the estimated coefficient on the Debt/Asset ratio is negative and statistically significant in both regressions, indicating that highly leveraged firms that were included in the DJSI faced stronger negative market reactions. This supports the hypothesis that bondholder protections in the form of more stringent debt covenants that limit managerial action are perceived as constraining and counteracting the potential advantages of sustainability leadership. In other words, sustainability leadership efforts by highly leveraged firms are viewed more unfavorably. Highly leveraged firms already have higher risk and constraints on managerial discretion. Under these circumstances, inclusion in the DJSI is perceived to further increase the firm's risks and future cost outflows. The dummy variable Industry1 has a significant negative coefficient indicating that DJSI inclusion of firms in pollution intensive industries such as chemicals, fuels, and basic materials are viewed more negatively by investors. It also suggests that although these firms may be top performers within their industry sectors, the upside from such sustainability leadership is perceived to be lower than other industries. Due to the unavoidable pollution intensity of the industry, investors perceive that these firms face higher risk of future regulations and stakeholder distrust. Interestingly, the time Trend variable has a positive significant coefficient, which indicates that over time, inclusion in the DJSI has had an increasingly positive reaction from investors and that the positive reputation of DJSI is growing.

In order to test if sustainability performance ratings from other sources such as KLD affect these market reactions, we included two additional variables in the regressions, namely SusStrength and SusConcern. These variables respectively are the number of sustainability strengths and sustainability concerns listed in KLD ratings for each of the firms in the event year. These results are shown in Panel A of Table 6. As shown, the number of observations declines

since KLD ratings information was not available all firms. The estimated coefficient for SusStrength is positive and significantly different from zero (P<0.1) but only in the shorter event window. This weakly supports the hypothesis that inclusion in the DJSI of firms with prior strong sustainability reputation is viewed positively by investors.

**Table 6: Robust Regression with CAR as Dependent Variable with KLD Variables**

| Dependent Variable | **Panel A** DJSI Inclusions (N=165) | | | | **Panel B** DJSI Exclusions (N=110) | | | |
|---|---|---|---|---|---|---|---|---|
| | CAR(-1,+1) | | CAR(-5,+2) | | CAR(-1,+1) | | CAR(-5,+2) | |
| Exp Variable↓ | Coeff | *t*-stat | Coeff | *t*-stat | Coeff | *t*-stat | Coeff | *t*-stat |
| Debt/Asset | -0.0364 | -2.31** | -0.0346 | -1.75* | -0.0072 | -0.57 | -0.0163 | -1.15 |
| Log(asset) | -0.0018 | -0.72 | -0.0042 | -1.36 | -0.0033 | -1.08 | -0.0002 | -0.07 |
| ROA | -0.0106 | -0.28 | -0.0072 | -0.15 | -0.0354 | -1.11 | -0.0243 | -0.67 |
| Trend | 0.0021 | 2.01** | 0.0035 | 2.69*** | -0.0008 | -0.65 | 0.0004 | 0.31 |
| DJSI years | -0.0002 | -0.18 | -0.0003 | -0.20 | | | | |
| SusStrength | 0.0014 | 1.66* | 0.0010 | 0.88 | -0.0012 | -0.99 | 0.0006 | 0.48 |
| SusConcern | -0.0002 | -0.21 | -0.0009 | -0.68 | -0.0014 | -0.83 | -0.0021 | -1.07 |
| Indutry1 | -0.0069 | -0.74 | -0.0348 | -2.98*** | -0.0092 | -0.68 | -0.0241 | -1.56 |
| | | | | | | | | |
| Industry2 | 0.0033 | 0.44 | -0.0069 | -0.72 | -0.0137 | -1.30 | -0.0166 | -1.39 |
| Asset-turnover | 0.0038 | 1.42 | 0.0004 | 0.12 | -0.0058 | -1.64 | -0.0069 | -1.73* |
| International ops | -0.0018 | -0.42 | -0.0017 | -0.42 | 0.0083 | 0.37 | 0.0016 | 0.06 |
| FirstTimeDeleted | | | | | -0.0201 | -1.77* | -0.0224 | -1.73* |
| FTD*DJSI | | | | | 0.0028 | 1.50 | 0.0031 | 1.44 |
| Constant | 0.0286 | 0.85 | 0.0286 | 0.85 | 0.0603 | 1.81* | 0.0347 | 0.92 |
| Overall F stat | 1.68* | | 2.47*** | | 1.22 | | 1.24 | |

***=P<0.01, **=P<0.0 5, *=P<0.1.

*B. Results for DJSI Deletions*

Panel B in Tables 2, 3, and 4 presents the results of the event study for firms that were deleted from the DJSI where the event dates are AD, ED, and AcD respectively. As in the case of index inclusions, the statistical significance of the results improves when the actual date (AcD) is used as the event date. This finding indicates that choosing an appropriate event date can improve the reliability of the results.

From Table 4, Panel B, it can be observed that firms that were deleted from the DJSI generally had negative market reactions. While the negative reactions are not statistically significant for shorter event windows of ±2 days, they are significantly negative for longer windows of (-3,+3) and (-5,+2) days. The CAR is -1.25 percent over the event window (-5, +2). Observation of the daily abnormal returns reveals that these daily negative reactions were small starting from the event date but cumulatively significant, suggesting that the market processed the information gradually. The asymmetric reaction, i.e., negative market reactions for both index

inclusions and deletions, supports our hypothesis that since firm deletion from the DJSI is conditional on its previous addition to the DJSI, investors perceive deletion mainly as an indicator of a failed investment in sustainability leadership strategy, and they react negatively regardless of the initial reaction to the DJSI additions.

Panel B in tables 5 and 6 reports estimation results for regression equations analyzing factors influencing the CARs for index deletions, similar to Panel A results for index additions. However, to test hypothesis H4, we include two additional explanatory variables, *FirstTimeDeleted* and *FTD*DJSI*, where *FirstTimeDeleted* is a dummy variable taking the value of 1, if the firm was deleted for the first time from the DJSI, and *FTD*DJSI* is an interaction variable between *FirstTimeDeleted* and the number of years that the firm had been in the DJSI previously *(DJSI year).* H4 predicts a negative coefficient for *FirstTimeDeleted,* suggesting that firms that were deleted for the first time face strong negative reactions, and a positive coefficient on *FTD*DJSI* suggesting that this negative reaction is muted if the firm has a long prior tenure on the DJSI, hinting that the deletion is likely a temporary setback. The estimation results shown in Panel B, Table 6 confirm the predicted statistically significant (P<0.10), negative coefficient for *FirstTimeDeleted*. The coefficient on the interaction term *FTD*DJSI* is positive as predicted, but it is not statistically different from zero. These findings partially support H4.

It is also notable that the coefficients on *Debt/Asset* ratio are consistently negative, but not significantly different from zero for the DJSI deletion sample, as compared to the DJSI addition sample which has negative and significant coefficient estimates. This asymmetric reaction also supports our conjecture that DJSI deletion is viewed as a conditional event and a failed sustainability investment, and not as an opposite equivalent of a DJSI addition event.

### *C. Additional Analyses*

We also used the Fama and French (1993) three-factor model as the return generating process to estimate normal and abnormal returns. The Fama French three-factor model for normal return is:

$$R_{it} = \propto_i + \beta_i R_{mt} + \gamma_i SMB_t + \partial_i HML_t + \varepsilon_{it} , \quad (6)$$

where $R_{it}$ is the return on security (firm) *i* for period (day) *t*, $R_{mt}$ is the return on the benchmark market index for day *t*, $SMB_t$ is the average on small market capitalization portfolios minus the average return on three large market portfolios; $HML_t$ is the average return on two high book to market equity portfolios minus the average return on two low book to market equity portfolios; $\varepsilon_{it}$ the error term is assumed to be distributed with mean zero and variance $\sigma_\epsilon^2$. See Fama and French (1993) for a detailed description of $SMB_t$ and $HML_t$. We estimate Equation 6 separately for each firm in our sample for each year, using an estimation window of 252 days prior to the event date. The abnormal return model is:

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} - \hat{\gamma}_i SMB_t - \hat{\partial}_i HML_t. \quad (7)$$

The results of the event study with actual date (AcD) and the Fama-French three-factor model are shown in Table 7. It can be observed that the three-factor model results for DJSI additions are similar to simple market model results, showing statistically significant negative CARs for all

windows. For DJSI deletions, the CARs for all windows are negative as expected, but not statistically different from zero, which is consistent with our prediction.

We also used the four-factor model suggested by Carhart (1997), which augments the Fama and French (1993) three-factor model with an additional momentum factor which is the difference between average return on two high prior return portfolios, and two low prior return portfolios. The results of the four-factor model event study were very similar to results with the three factor model and are shown in Table 8.

**Table 7: Fama-French Three-Factor Model (Actual Dates)**

| | **Panel A: Index Inclusions (N=196)** | | | | **Panel B: Index Inclusions (N=133)** | | | |
|---|---|---|---|---|---|---|---|---|
| **Window** | Mean Returns (%) | Percentage Negative | CDA *t*-test | Rank Z | Mean Returns (%) | Percentage Negative | CDA *t*-test | Rank Z |
| **CAR(-1,+1)** | -0.86 | 64 | -3.22*** | -3.66*** | -0.17 | 48 | -0.42 | -0.68 |
| **CAR(-2,+2)** | -1.07 | 62 | -3.12*** | -2.94*** | -0.46 | 55 | -0.88 | -1.25 |
| **CAR(-3,+3)** | -0.88 | 57 | -2.17** | -1.65* | -1.11 | 55 | -1.81 | -1.6 |
| **CAR(-5,+2)** | -0.97 | 59 | -2.23** | -2.08** | -1.18 | 52 | -1.80 | -0.84 |

**Table 8: Fama-French Four-Factor Model (Actual Dates)**

| | **Panel A: Index Inclusions(N=196)** | | | | **Panel B: Index Exclusions (N=133)** | | | |
|---|---|---|---|---|---|---|---|---|
| **Window** | Mean Returns (%) | Percentage Negative | CDA *t*-test | Sign Z | Mean Returns (%) | Percentage Negative | CDA *t*-test | Sign Z |
| **CAR(-1,+1)** | -0.83 | 62 | -3.19*** | -3.22*** | 0.01 | 46 | 0.02 | 1.07 |
| **CAR(-2,+2)** | -0.98 | 63 | -2.92*** | -3.37*** | -0.08 | 49 | -0.15 | 0.21 |
| **CAR(-3,+3)** | -0.81 | 59 | -2.05** | -2.37** | -0.38 | 52 | -0.59 | -0.31 |
| **CAR(-5,+2)** | -1.01 | 57 | -2.38** | -1.65** | -0.75 | 49 | -1.09 | -0.13 |

### *D. Exploring Potential Alternative Hypotheses*

It can be argued that these stock market reactions are not in response to sustainability leadership efforts, but simply from trading effects resulting from the inclusion in or the exclusion from a commonly used market index. We explore several hypotheses proposed in the literature regarding market reactions to index changes and their applicability to our results below.

The downward sloping demand curve hypothesis (Shleifer, 1986) predicts that subsequent to the announcement of the inclusion, a substantial portion of the firm's shares are bought by index funds attempting to mimic the return on the index. Such buying represents a long-term outward shift of the demand curve for the firm's equity, resulting in a share price increase at the announcement of the inclusion. However, very few index funds try to mimic the DJSI currently. The DJSI had only 26 licensees worldwide in 2013, a decline from 31 licensees in 2012,[2] and the

[2] Sources: http://www.sustainability-indices.com/images/review-presentation-2012.pdf and http://www.sustainability-indices.com/images/review-presentation-2013.pdf.

global investment tracking the DJSI indices was estimated at around $8 billion in 2011[3]. As a result, shift in demand arising from indexing is unlikely to explain the observed results. Moreover, we find that the market reacted negatively to DJSI inclusion, which is contrary to the predictions from downward sloping demand hypotheses. Also additions and deletions should have symmetric but opposite reactions if demand curves are downward sloping, which is also not observed.

Similar to the downward sloping demand curve, the price pressure hypothesis also postulates a downward sloping demand curve, but only in the short term. (Harris and Gurel, 1986; Blouin *et al*., 2000). The upward price pressure from momentary excess demand from indexing activity drives up prices and encourages premature selling. But once the momentary demand is satisfied, the prices fall. Under this hypothesis, prices are expected to rise in the short run, but these gains are expected to reverse shortly thereafter. The market response should be symmetrically opposite for deleted firms. Our results are not consistent with these predictions.

Cheung and Roca (2013) hypothesize that investors may derive utility from expression of their moral or ethical beliefs over and above the utility from financial returns from their stock holdings of sustainable firms. Such investor utility from sustainability is posited to result in positive stock market reactions to DJSI inclusions (corporate sustainability taste hypothesis). The alternative hypothesis termed the "redundancy hypothesis" predicts a negative effect on stock prices following inclusion in the DJSI, due to the imposition of additional sustainability constraints on firm optimal choices. While the direction of the effect on stock prices differs under these two hypotheses, both predict symmetrically opposite reaction to DJSI deletions as compared to DJSI additions.

Merton's (1987) information and search cost hypothesis posits that investors may be aware of only a subset of all firms in their portfolio decisions, and the inclusion of a particular stock in an index increases investor awareness and reduces their search or shadow costs, resulting in positive price responses to index inclusions. Denis *et al*. (2003) suggest that the cause and effect may run the other way, that is inclusion in an index leads to increased monitoring of the management by analysts and investors; and in turn the management responds with greater effort leading to better future performance expectations. They find that investors' earnings expectations increased for stocks that were included in the S&P500 index relative to comparable benchmark stocks. Chen *et al.* (2004) draw on the information hypotheses to explain observed asymmetric price responses to S&P 500 additions compared to deletions. That is, while firms included in the index see a permanent price increase, there is no permanent decline for deleted firms, because investors do not become 'unaware' of a firm when it is deleted from the index. Robinson *et al*. (2011) draw on the investor awareness hypothesis to explain their finding significant positive 60-day CARs for DJSI additions and non-significant changes following deletions. The investor awareness hypothesis is useful in explaining asymmetry reactions, i.e., a positive reaction to index additions and relatively weaker negative reaction to index additions and deletions respectively. However, it cannot explain our finding of negative reactions to both additions and deletions.

[3] Source: Press release: http://www.sustainability-indices.com/images/110228-ishares-etf-uk.pdf

## V. Summary and Conclusions

We use the tournament theory to examine market reactions to firms' sustainability efforts. We use the inclusion or exclusion of a firm in the DJSI as a proxy for sustainability effort. We argue that the DJSI selection process is effectively a relative performance evaluation tournament and as a result creates amplified sustainability valuation signals. The DJSI status change conveys value relevant information to the stock market, and as a result, stock prices react to the DJSI status changes. We hypothesize asymmetric reactions to DJSI inclusions and deletions. Our results indicate that signaling sustainability leadership by winning a tournament like DJSI membership is perceived as value destroying on average by the market, resulting in negative CARs around the DJSI addition event. However, the market reactions are sensitive to the choice of the event date. A more nuanced definition of the event based on when the information actually became publicly available for the first time results in stronger and more reliable estimates of the market reactions. The information value of DJSI membership appears to be increasing over time, as indicated by a significant trend effect on CARs. Abnormal returns were also found to be influenced by the debt/asset ratio indicating that sustainability leadership by highly leveraged firms is viewed more negatively. With respect to DJSI deletions, as predicted, the market reactions were negative. This supports our hypothesis that markets perceive DJSI deletions, which are conditional on the firm being included in the DJSI previously, primarily as failed investments/strategy. As predicted, firms that were deleted for the first time from the DJSI faced stronger negative reactions. Our key theoretical insight that markets do not perceive DJSI additions and DJSI deletions as equivalent but opposite events, but rather as asymmetric events, is empirically supported. Our study thus contributes to this literature by addressing the limitations of extant studies, presenting new theoretical insights that help reconcile conflicting results in prior studies.

In the current environment where there is considerable high profile attention by the business press on firms' ability to not only be financially successful, but also to focus on other aspects such as the environment and the broader society, sustainability should be an important nonfinancial metric. Therefore, on the face of it, an important nonfinancial signal such as inclusion in or exclusion from the DJSI should have positive (inclusion) or negative (exclusion) effects. However, our results showing a negative reaction to both DJSI inclusion and exclusion indicates that the market assesses the benefits of sustainability efforts only in the context of the costs that such efforts impose on other aspects of the firm's performance. Inclusion is viewed negatively because it signals that sustainability efforts are costly, without commensurate financial benefits. Exclusion indicates a failure to maintain the chosen strategy focus. Market reactions are even more negative to highly leveraged firms, indicating that perhaps the market perceives a cognitive dissonance for firms that undertake environmental/social sustainability efforts but are financially less sustainable.

## References

**Allouche, José, and Patrice Laroche**. 2005. "A Meta-Analytical Investigation of the Relationship Between Corporate Social and Financial Performance." *Revue de Gestion des Ressources Humaines,* 57: 18–41.

**Black, Fischer, and Myron Scholes.** (1973). "The Pricing of Options and Corporate Liabilities." *Journal of Political Economy,* 81(3): 637-54.

**Blouin Jennifer L., Jana Smith Raedy, and Douglas A. Shackelford**. 2000. "*The Impact of Capital Gains Taxes On Stock Price Reactions To S&P 500 Inclusion*." Working Paper 8011, National Bureau of Economic Research (NBER) http://www.nber.org/papers/w8011.

**Boehmer, Ekkehart, Jim Masumeci, and Annette B. Poulsen**. 1991. "Event-Study Methodology under Conditions of Event-Induced Variance." *Journal of Financial Economics,* 30(2): 253–72.

**Bowen, Howard R**. 1953. *Social Responsibilities of the Businessman*. New York: Harper.

**Carhart, Mark M.** 1997. "On Persistence in Mutual Fund Performance." *Journal of Finance,* 52(1): 57–82.

**Carroll, Archie B.** 1979. "A Three-Dimensional Conceptual Model of Corporate Performance." *The Academy of Management Review,* 4(4): 497–505.

**Chen, Honghui, Gregory Noronha, and Vijay Singal**. 2004. "The Price Response to S&P 500 Index Additions and Deletions: Evidence of Asymmetry and a New Explanation." *Journal of Finance,* 59(4): 1901–29.

**Cheung, Adrian Wai Kong.** 2011. "Do Stock Investors Value Corporate Sustainability? Evidence from an Event Study." *Journal of Business Ethics,* 99(2): 145–65.

**Cheung Adrian Wai Kong, and Eduardo Roca**. 2013. "The Effect on Price, Liquidity and Risk when Stocks are Added to and Deleted from a Sustainability Index: Evidence from the Asia Pacific Context." *Journal of Asian Economics,* 24: 51–65.

**Consolandi, Costanza, Ameeta Jaiswal-Dale, Elisa Poggiani, and Alessandro Vercelli**. 2009. "Global Standards and Ethical Stock Indexes: The Case of the Dow Jones Sustainability Stoxx Index." *Journal of Business Ethics,* 87: 185–97.

**Corrado, Charles J.** 1989. "A Nonparametric Test for Abnormal Security-Price Performance in Event Studies." *Journal of Financial Economics,* 23(2): 385–95.

**Cowan, Arnold Richard**. 1992. "Nonparametric Event Study Tests." *Review of Quantitative Finance and Accounting,* 2(4): 343-58.

**Cowan, Arnold Richard**. 2007. *Eventus 8.0 User's Guide: Eventus Software for Event Studies and Financial Market Research,* Ames, Iowa: Cowan Research L.C.

**Davis, Keith**. 1960. "Can Business Afford to Ignore Social Responsibilities?" *California Management Review,* 2(3): 70–6.

**Denis, Diane K., John J. McConnell, Alexei V. Ovtchinnikov, and Yun Yu**. 2003. "S&P 500 Index Additions and Earnings Expectations." *The Journal of Finance,* 58(5): 1821–40.

**Detre, Joshua D. and Michael A. Gunderson**. 2011. "The Triple Bottom Line: What is the Impact on the Returns to Agribusiness?" *International Food and Agribusiness Management Review,* 14(4): 165-78.

**Dhaliwal, Dan S., Oliver Zhen Li, Albert Tsang, and Yong George Yang**. 2011. "Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting." *The Accounting Review,* 86(1): 59–100.

**Dhillon, Upinder, and Herb Johnson**. 1991. "Changes in the Standard and Poor's 500 List." *The Journal of Business,* 64(1): 75–85.

**Dow Jones Sustainability Index Guide Book**. 2011. http://www.sam-group.com/images/SAM_Yearbook_2011_tcm794-290391.pdf (accessed on June 10, 2012).

**Fama, Eugene F., Lawrence Fisher, Michael C. Jensen, and Richard Roll.** 1969. "The Adjustment of Stock Prices to New Information." *International Economic Review,* 10(1): 1-21.

**Fama, Eugene F., and Kenneth R. French**. 1993. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics,* 33(1): 3–56.

**Friedman, Milton**. 1970. "The Social Responsibility of Business is to Increase its Profits." *The New York Times Magazine,* September 13.

**Green Jerry R., and Nancy L. Stokey**. 1983. "A Comparison of Tournaments and Contracts." *Journal of Political Economy*, 91(3): 349-64.

**Harris, Lawrence, and Eitan Gurel**. 1986. "Price and Volume Effects Associated with Changes in the S&P 500 List: New Evidence for the Existence of Price Pressures." *The Journal of Finance,* 41(4): 815–29.

**Hart, Stuart L.** 2005. "Innovation, Creative Destruction and Sustainability." *Research-Technology Management*, 48(5): 21-7.

**Hawn, Olga, Aaron Chatterji, and Will Mitchell.** 2013. *How Financial Market Legitimacy Conditions Changes in Social Legitimacy: The Impact of Additions and Deletions by the Dow Jones Sustainability Index*, Working paper, Duke University.

**Hawn Olga, Aaron Chatterji, and Will Mitchell**. 2014. *How Firm Performance Moderates the Effect of Changes in Status on Investor Perceptions: Additions and Deletions by the Dow Jones Sustainability Index,* Working paper, Duke University.

**Hegde Shantaram P., and John B. McDermott**. 2003. "The Liquidity Effects of Revisions to the S&P 500 Index: an Empirical Analysis." *Journal of Financial Markets*, 6(3): 413–59.

**Holmstrom, Bengt**. 1982. "Moral Hazard in Teams." *Bell Journal of Economics,* 13(2): 324-40.

**Jaffe, Adam B., Steven R. Peterson, Paul R. Portney, and Robert N. Stavins**. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature,* 33(1): 132-63.

**Jensen, Michael C., and William H. Meckling**. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics,* 3(4): 305-60.

**Karlsson, Josefin, and Yana Chakarova**. 2008. *Does Corporate Social Responsibility Pay Off?* Unpublished Thesis, School of Business, Economics and Law, Göteberg University https://gupea.ub.gu.se/bitstream/2077/9911/1/0708.7.pdf.

**Kiron, David, Nina Kruschwitz, Knut Haanaes, and Ingrid Von Streng Velken**. 2012. "Sustainability Nears a Tipping Point." *MIT Sloan Management Review*, 53(2): 69-74.

**Lackmann, Julia, Jürgen Ernstberger, and Michael Stich**. 2012. "Market Reactions to Increased Reliability of Sustainability Information." *Journal of Business Ethics,* 107(2): 111-28.

**Lazear, Edward P., and Sherwin Rosen**. 1981. "Rank Order Tournaments as Optimum Labor Contracts." *Journal of Political Economy,* 89(5): 841-64.

**Lys, Thomas, James P. Naughton, and Clare Wang.** 2015. "Signaling Through Corporate Accountability Reporting." *Journal of Accounting and Economics*, 60(1): 56–72.

**MacKinlay, A. Craig**. 1997. "Event Studies in Economics and Finance." *Journal of Economic Literature,* 35(1): 13–39.

**Margolis, Joshua D., Hillary Anger Elfenbein, and James P. Walsh**. 2009. *Does It Pay to be Good… and Does It Matter? A Meta-Analysis of the Relationship between Corporate Social and Financial Performance*. Working paper: SSRN: http://ssrn.com/abstract=1866371 or http://dx.doi.org/10.2139/ssrn.1866371.

**McWillams, Abagail, and Donald Siegel**. 1997. "Event Studies in Management Research: Theoretical and Empirical Issues." *Academy of Management Journal,* 40(3): 626-57.

**McWillams, Abagail, Donald Siegel, and Siew Hong Teoh**. 1999. "Issues in the Use of the Event Study Methodology: Critical Analysis of Corporate Social Responsibility Studies." *Organizational Research Methods*, 2(4): 340-65.

**Merton, Robert C.** 1987. "Simple Model of Capital Market Equilibrium with Incomplete Information." *The Journal of Finance,* 42(3): 483-510.

**Mikkelson, Wayne H., and M. Megan Partch.** 1988. "Withdrawn Security Offerings." *The Journal of Financial and Quantitative Analysis,* 23(2): 119-33.

**Nalebuff, Barry J., and Joseph E. Stiglitz.** 1983. "Prizes and Incentives: Towards a General Theory of Compensation and Competition." *The Bell Journal of Economics,* 14(1): 21-43.

**Oberndorfer, Ulrich, Peter Schmidt, Marcus Wagner, and Andreas Ziegler.** 2013. "Does the Stock Market Value the Inclusion in a Sustainability Stock Index? An Event Study Analysis for German Firms." *Journal of Environmental Economics and Management,* 66(3): 497-509.

**Orlitzky, Marc**. 2008. "Corporate Social Performance and Financial Performance: A Research Synthesis." In *The Oxford Handbook of Corporate Social Responsibility,* ed. Andrew Crane, Dirk Matten, Abagail McWilliams, Jeremy Moon, and Donald Siegel, 113–34. Oxford: Oxford University Press.

**Patell, James M.** 1976. "Corporate Forecasts of Earnings per Share and Stock Price Behavior: Empirical Tests." *Journal of Accounting Research,* 14(2): 246–76.

**Peterson, Pamela P.** 1989. "Event Studies: A Review of Issues and Methodology." *Quarterly Journal of Business and Economics,* 28(3): 36-66.

**Porter, Michael E.** 1991. "America's Green Strategy." *Scientific American,* 264 (4): 96.

**Porter, Michael E., and Mark R. Kramer**. 2006. "Strategy and Society: The Link Between Competitive Advantage and Corporate Social Responsibility." *Harvard Business Review,* 84(12): 78–92.

**Porter, Michael E., and Mark R. Kramer.** 2011. "Creating Shared Value." *Harvard Business Review,* 89(1-2): 62–77.

**PWC**. 2014. *Sustainability Goes Mainstream: Insights into Investor Views* http://www.pwc.com/us/en/pwc-investor-resource-institute/publications/sustainability-goes-mainstream-investor-views.jhtml (accessed June 10, 2016).

**Robinson, Michael, Anne Kleffner, and Stephanie Bertels**. 2011. "Signaling Sustainability Leadership: Empirical Evidence of the Value of DJSI Membership." *Journal of Business Ethics,* 101(3): 493–505.

**Rosen, Sherwin**. 1986. "Prizes and Incentives in Elimination Tournaments." *American Economic Review,* 76(4): 701–15.

**Shleifer, Andrei**. 1986. "Do Demand Curves for Stocks Slope Down?" *The Journal of Finance,* 41(3): 579-90.

**US SIF**. 2015. *2014 Report on US Sustainable, Responsible and Impact Investing Trends*. Washington, DC: US SIF Foundation.

**Waddock, Sandra A. and Samuel A. Graves**. 1997. "The Corporate Social Performance-Financial Performance Link." *Strategic Management Journal,* 18(4): 303–19.

**Wang, Qian, Junsheng Dou, and Shenghua**. 2015. "A Meta-Analytic Review of Corporate Social Responsibility and Corporate Financial Performance: The Moderating Effect of Contextual Factors." *Business and Society*. 1-39. 0007650315584317.

**Wartick, Steven L., and Philip L. Cochran**. 1985. "The Evolution of the Corporate Social Performance Model." *The Academy of Management Review,* 10(4):758–69.

**Wood, Donna J.** 1991. "Corporate Social Performance Revisited." *The Academy of Management Review,* 16(4): 691–718.

*The Journal of Business Inquiry* 2017, 16, Issue 1 (Special Issue), 36-49
http:www.uvu.edu/woodbury/jbi/articles/
ISSN 2155-4072

# Main Effects of Executive Pay and Board Diversity on Sustainability: Evidence from the Top Global 100 Firms

*By* RAVI CHINTA*

*Water productivity has become a major driver of the current sustainability wave in the business world. However, there is scant research on factors that drive sustainability at the firm level. Our study examines the main and interaction effects of "CEO-to-average worker pay" and "gender diversity on board of directors" on water productivity at the firm level. Based on data from the top Global 100 sustainable firms, my study shows that both "CEO-to-average worker pay" and "gender diversity on board of directors" have positive main effects but a negative interaction effect on water productivity at the firm level.*

**Keywords**: Sustainability; Water Productivity at Firm Level; Women on Corporate Boards; CEO-to-average worker pay

JEL Classification: M14

## I. Introduction

Water has become a scarce resource for humanity (Cosgrove and Rijsberman, 2000 and 2014). Across the world, humans are facing crises of sustainability, resilience, and adaptation with respect to water sources. Can humans sustain the earth to provide water sources for future generations? Hoekstra and Chapagain (2011) note that globalization of water issues is a new phenomenon especially when fresh water resources are discussed. Shortages of water will radically change population movements across and within nations. Problems associated with climate change or sustainable water supply have long-term consequences such as increasing economic inequality or break-up of communities. Escalating resource use at individual levels has led to a swirl of compounding pressures at the collective level potentially destabilizing human existence. In short, sustainability has become a concern for all. In a landmark report, the Brundtland Commission (World Commission on Environment and Development, 1987, p. 70) defined sustainable development as

> "*... development that meets the needs of the present without compromising the ability of future generations to meet their own needs*."

Note that the above definition makes no mention of human well-being. In the Commission's view, sustainable development requires that future generations have no less of the means to meet their needs than humanity does currently. In their view, "sustainable development" requires that relative to their populations each generation should bequeath to its successor at least as large a quantity of what may be called an economy's "productive base" as it had itself inherited from its predecessor. That raises another problem with the Commission's reasoning: it does not explain

* Ravi Chinta, Department Head, Business Administration Department, College of Business, Auburn University at Montgomery, Montgomery, AL 36117. Phone: (513) 262-5512. Email: ravichinta@hotmail.com.

how the productive base should be measured. In sustainability and ecological conservatism literature, water is considered an essential and universal part of economy's "productive base." Economists (Arrow *et al.*, 2012) contend that the "productive base" of an economy is directly correlated to a comprehensive measure of the economy's wealth, and go on to apply that method to assess sustainable development at the level of nations. Historically, it is known that civilizations grew around river basins, and nations with abundant water resources were consistently richer and more advanced than nations with arid lands. In this paper, I apply the same paradigm at the level of a firm to study sustainable development at the firm level with a particular focus on water usage at the firm level. Specifically, I study firm-level investments to make assessments about sustainable development at the firm level. Sustainability at the firm level is often understood as long-term survival of the firm (de Geus, 1997). However, I define sustainability at the firm level, in my study, in terms of green practices of the firm and in particular water conservation practices at the firm level. Long-term survival of the firm is a much broader construct that may include such things as successful business strategies; these may have nothing to do with green practices of the firm. My study makes this conceptual distinction, and focuses on green practices of the firm and specifically water conservation practices at the firm level.

## II. Sustainability as a Firm-Level Imperative

Per Hilton (2003, p. 372), it is crucial for any company to focus on customers' needs and desires during its decision making processes. Customers are becoming more demanding in their decision making, particularly due to the flow of information regarding the need to combat global warming using recycled and renewable resources, among others. The majority of U.S. adults (82 percent) are knowledgeable about which companies and brands have a strong history of sustainability. Of those, a staggering 80 percent consider the history of the company's sustainability when purchasing its products (Marketing Weekly News, 2012).

Elkington (1999, p. 28) suggests that businesses have a moral responsibility to ensure that sustainability is on their growth agenda. Even if companies are created as profit-seeking entities, their long-term profitability may not be achievable if their social and environmental issues are not managed properly. Some management leaders have been paying greater attention to the potential relationship between the way they run their businesses and the implications for the environment, society, and sustainable development. Such interlocking requires a sustainability revolution leading to a paradigm shift (Edwards, 2005).

Edwards (2005) suggests that efficient management of firm resources is also ethical and compassionate. "The future belongs to those who understand that doing more with less is compassionate, prosperous and enduring and thus more intelligent, even competitive." (Edwards 2005, p. 49). It is no wonder that the TQM (Total Quality Management) paradigm that has swept the corporate world in the past few decades dovetails very well with the current emphasis on sustainability. The big difference is that while TQM was predominantly focused on the continuous improvement of the business processes within a firm, the sustainability thrust of today is broader in scope and views the global supply chain as a business ecosystem within much larger time frames.

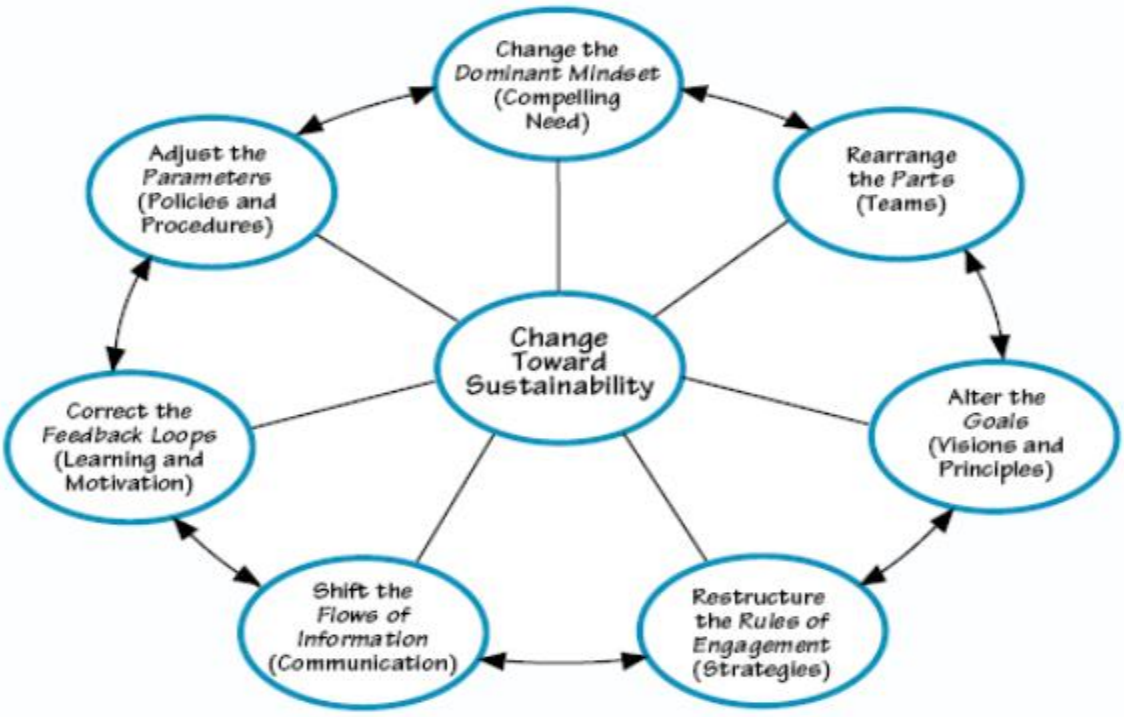
Globalization, ethics, technology, and now sustainability have become powerful forces on businesses. In particular, the sustainability emphasis in a given company depends on its relationships with its stakeholders, suppliers, distributors, and clients. Hence, to address the concept of sustainability, the whole company – as well as all the parties in the value chain – should

become involved in a new way of thinking and behaving (Hilton, 2003, p. 376). Hart (as cited in Elkington, 1999, p. 72) states that "the more humans learn about the challenges of sustainability, the clearer it is that they are poised at the threshold of an historic moment in which many of the world's industries may be transformed." Companies should take into account the externalities, such as pollution and emission of toxic gases, generated by their activities in order to avoid complications – complaints or even lawsuits – that can diminish performance and lessen the value of their business. The environmental bottom line brings a new form of evaluating the influence of companies on environmental problems by relating their performance to the amount of emissions/waste produced per unit of a volume/value of production (Elkington, 1999, p. 82). Debora D. Anderson, Vice President, Environmental Quality Worldwide, Procter and Gamble, lucidly states that sustainability is a new business imperative that "will be the price of entry that society will demand for business success in the 21st century" (as cited in Elkington, 1999, p. 1). The advantages of sustainability from a corporate perspective are manifold. First, there is cost reduction through increased efficiency. Second, reputational plaudits flow from both the market and from customers. Third, the increased brand value can give the company a competitive edge. Fourth, improved risk management at the firm level stems from firm-level investments in sustainability initiatives (Dow Jones Sustainability World Index, 2014).

While sustainability appears to be a conceptually sound pursuit for all businesses (Chinta *et al.*, 2014), one key question remains unanswered: why are all firms not pursuing sustainability as a primary strategy? What are the promoters and inhibitors of sustainability efforts at the firm level? Is it too expensive or resource-intensive to be an affordable venture for most firms? What factors influence and impel firms to become sustainable? At one time, quality initiatives were thought to be too costly and hence not pursued, but over time quality has become a minimum requirement to be in business as more and more competitors have adopted quality as an integral part of their activities. Adoption of quality measures required a mindset or a strong belief system that challenged the existing paradigms that had formerly prevented their adoption. In a similar vein, could sustainability be slow moving and gradually grow into a widespread phenomenon as more and more firms develop the mindset (a top management emphasis) to adopt it?

Understanding the factors that promote sustainability at the firm level is a question I want to focus on in this study. However, sustainability is a very broad area and is as multi-faceted as the scope of any business. A conceptual handle is required to study sustainability at the firm level. Fortunately, Doppelt (2003) and Hitchcock and Willard (2008) provide a conceptual framework to help companies evaluate their errors and governance systems, and change initiatives in the sustainability area so as to permanently embed sustainability in their business processes, values, and culture (see Figure 1 by Doppelt, 2003).

**Figure 1: The Wheel of Change Toward Sustainability**




The "Wheel of Change Toward Sustainability" shows how the seven interventions interact to form a continuous reinforcing process of transformation toward sustainability.

Interestingly, the sustainability call of the Bundtland report, which addresses global environmental issues, can be applied with equal force to the corporate environment. Due to the fact that limited environmental resources are often overexploited, there is a need to integrate environmental and social decisions into the economic decision-making processes of businesses (Dresner, 2002, p. 33). According to Doppelt (2003, p. 139), in business, sustainability means "managing human and natural capital with the same vigor business professionals apply to the management of financial capital."

Businesses are expected to follow regulations as well as respond to societal expectations. "Corporate behavior must not only ensure returns to shareholders, wages to employees, and products and services to customers, but it must also respond to societal and environmental concerns" (Elgar, 2008, p. 178). Given these enhanced expectations from the stakeholders of a firm, the assessment of firm-level sustainability takes front stage. It is well recognized that multiple metrics will be required to assess firm-level sustainability, and that these different measures will be driven differently by the top management of various firms.

## III. Firm-Level Sustainability Assessment

The International Standards Organization (ISO) is a non-governmental organization that links the public and private sectors with the intention of promoting international commerce. It was launched in 1947 as the largest developer and publisher of international standards in the world. Technical committees are responsible for developing the ISO standards (ISO, 2014).

The ISO 14001, launched in 1993, is focused on the environmental dimension, for which it proposes a set of requirements to be implemented in the operational processes of companies to emphasize the potential benefits of improving their environmental performance. According to the ISO 14001, the companies that earn its certification are likely to have the following advantages:

(a) fortifying the company's image and participation in the market;
(b) preserving natural resources and energy;
(c) developing a well-structured production process capable of improving production efficiency and environmental performance;
(d) maximizing results of production;
(e) decreasing costs by promoting efficiency in energy and water consumption, disposal of waste, recycling paper and energy, and insurance costs reduction;
(f) developing products and technologies that are more environmentally friendly;
(g) promoting better management of resources and dangerous substances;
(h) having better control of the environmental risks and reduction of associated costs through monitoring that guarantees risk prevention and/or minimization;
(i) providing better communication with employers, stakeholders, distributors, suppliers, government, and society;
(j) improving work conditions;
(k) adding value in the relationship with internal and external interest parties, including employees, shareholders, customers, suppliers, organizations of environmental control, and community;
(l) meeting the certification criteria of company's clients; and
(m) improving companies' and society's awareness of the importance of environmentally friendly behavior.

## IV. Focus of the Study and Research Hypotheses

Recognizing that sustainability is a very broad subject area that spans multiple levels of analysis, I limited my research study to firm-level water conservation practices in sustainability as a proxy measure for a firm's sustainability performance. Furthermore, I was also interested in factors that promote firm-level sustainability practices. Specifically, I was interested in the impact of gender diversity, i.e., female representation, on boards of directors (BODs) on water conservation practices within firms. Reed (2008) suggests that the complex and dynamic problem of water sources in the world requires flexible and transparent decision making that embraces a diversity of knowledge and values. At the firm level, the CEO and the board of directors bring about the needed diversity of knowledge and values.

The impact of the CEO on firm strategy is direct and unquestionable. However, excessive CEO pay is seen as an increasingly alienating factor that distances the CEO from the long-term interests of a firm (Heineman, 2008; Rappaport, 1999). Recent empirical findings confirmed that CEO compensation and green management practices are negatively correlated (Goktan, 2014). In a finer grain analysis of 500 firms in the U.S., Cordeiro and Sarkis (2008) reported that even when there is a positive link between CEO compensation and environmental performance, the linkage is restricted to only Investor Responsibility Research Council (IRRC) compliances and spill indices but do not include toxic emission indices. In a more nuanced and long-term perspective, Berrone and Gomez-Mejia (2009) found that firms' longer term environmental strategies merely function as a symbol since these strategies are not tied to CEO compensation. Bertrand and Mullainathan

(2001) and Jo and Kim (2008) also found that significant non-disclosure problems arose from short-term thinking by highly paid executives. Based on these prior findings, I posit that very high levels of CEO pay would lead to short-term thinking. Thus, the next hypothesis is as follows:

**$H_{01}$:** The greater the CEO pay relative to the average worker, the lesser would be the firm's sustainability productivity measures.

Gender diversity in BODs has been suggested to increase sustainability practices such as longer term strategic outlook of firms (McInerney-Lacombe *et al.*, 2008; Bear *et al*., 2010; Bernardi *et al*., 2009; Terjesen *et al.*, 2009), greater consideration of business ethics (Nielsen and Huse, 2010; Williams, 2003), and increased economic growth and social responsiveness (Galbreath, 2011). Recently, research results, based on the 329 largest companies in the United Kingdom, reported that the higher percentage of women on BODs of a company, the more likely that company will disclose its Greenhouse Gas (GHG) information (Liao *et al*., 2015). These studies lead to the following hypothesis with respect to our narrower focus on water conservation:

**$H_{02}$:** The greater gender diversity on the board of directors, the greater would be the firm's water conservation.

In addition to empirically investigating the main effects of "CEO-to-average worker pay" and "gender diversity in board of directors," the interaction effect of these two independent variables would also be of interest. Regression models with interaction effects should also include the main effects of the variables that were used to compute the interaction terms, even if these main effects are not significant (Aiken *et al*., 1991; Jaccard and Turrisi, 2003) because otherwise, main effects and interaction effects can get confounded. Hence the third hypothesis of this research is as follows.

**$H_{03}$:** "CEO-to-average worker pay" and "gender diversity on board of directors" would exhibit a significant interaction effect on water productivity at the firm level.

### *A. Variables and Measures*

A global consulting firm called Corporate Knights surveys a large number of firms engaged in the sustainability of their business environments, specifically the conduct of the businesses in four specific areas: energy consumption, greenhouse gas emissions, water usage, and waste practices. Additionally, the consulting firm also collects data on five firm-level attributes such as R&D intensity, CEO pay, tax burden, board diversity, and disclosure practices. Corporate Knights also publishes the data for the top Global 100 firms in the area of sustainability.

Our research is based on the compilation of two years of data from Corporate Knights[1] for the years 2010 and 2011 for the following two variables. Detailed descriptions of measurement of the two variables with detailed measurements as referenced in the existing literature are provided in Table 1.

1. Water Productivity (Molden *et al*., 2003; Pereira *et al*., 2012)
2. CEO-to-average worker pay (Bebchuk and Fried, 2003; Gabaix and Landier, 2008)
3. % Women on board (Erkut *et al*., 2008; Storvik and Teigen, 2010)

[1] Data publicly available at http://www.corporateknights.com at no charge.

## Table 1: Variable Measurement

| Construct | Calculation Methodology | Rationale |
|---|---|---|
| **#1. Water productivity** | The water productivity score ranges from 0-100%. It is calculated by dividing an entity's total revenue in USD for a particular fiscal period by total water withdrawn (GRI: EN8) in cubic meters for the same period. An entity's water productivity score is a function of two sub-scores: i) a group percentile score; and ii) an improvement factor score. The group percentile score is obtained by percentile ranking the entity's water productivity score against that of industry group peers in the same equity index as the entity in question. The improvement factor score is determined by measuring the trailing two-year improvement in the entity's group percentile score. An improvement factor score of 25% is awarded if water productivity has increased by at least 12.5% over the preceding two years. If this condition is not met, an improvement factor score of 0 is given. The final equation for an entity's water productivity score is represented below: **Water productivity score = (.75 x the group percentile score) + the improvement factor score (0 or .25)** | Water is a vital yet largely underappreciated input in many industrial sectors, including oil and gas and mining. Global fresh water scarcity has been identified by several international bodies as a growing threat to peace and prosperity in certain regions. Interruption of water supply can lead to lowered production, with negative effects on long-term competitiveness. |
| **#2. CEO-to-average worker pay** | The CEO–to-average worker pay score ranges from 0-100%. It is the ratio of CEO compensation for a particular year in USD divided by the average employee compensation in USD over the same time period. Average employee compensation is calculated by dividing the company's total wage bill for a particular year by the total number of employees over the same period. The CEO-to-average worker pay score is obtained by percentile ranking a company's ratio against that of every company in the equity index under consideration irrespective of industry group. The higher the ratio, the lower the pay equity score. | A disproportionate share of compensation expenditure going to one person can lead to lower overall workforce motivation, and can also be indicative of potential governance risks, or misalignments of interests. |
| **#3. Women on BOD** | The Board Diversity score for a firm ranges from 0-100%. It is calculated as the percentage of women on the entity's board of directors multiplied by two, up to a maximum of 100%. | An emerging body of research suggests that companies with more diverse boards, especially with respect to gender, have higher performance on key financial metrics such as Return on Equity, Return on Sales and Return on Invested Capital. CalPERS, the largest pension fund in the U.S., calls it the Diversity Return on Investment (DROI). |

### *B. Data Analyses and Findings*

Table 2 shows the descriptive statistics of the three variables in the study. The data yielded 146 independent observations of firms with no missing data.

**Table 2: Descriptive Statistics**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Water Productivity | 146 | $16 | $8,239,535 | $77,525.36 | $682,098 |
| CEO-to-Average Worker Pay | 146 | 4.88 | 516.53 | 87.95 | 56.73 |
| % Women on BOD | 146 | 0% | 50.0% | 12.8% | 10.9% |

Table 3 shows the bi-variate correlations between the three variables in my study in addition to the Kendall's Tau, which is a non-parametric correlation between pairs of variables. Spearman's rho, which is another non-parametric correlation matrix, showed similar results, but is not mentioned here. The table reveals the following empirical results.

**Table 3: Bi-Variate Correlations**

| | | Water Productivity | CEO-to-Average Worker Pay | %Women on BOD |
|---|---|---|---|---|
| Water Productivity | Kendall's Tau | 1 | -.007 | .112 |
| | Sig. (2-tailed) | | .911 | .060 |
| | N | 146 | 146 | 146 |
| CEO-to-Average Worker Pay | Kendall's Tau | | 1 | -.095 |
| | Sig. (2-tailed) | | | .133 |
| | N | | 146 | 146 |
| % Women on BOD | Kendall's Tau | | | 1 |
| | Sig. (2-tailed) | | | |
| | N | | | 146 |

** Significant at 0.01 level.

Table 4 shows the regression that was run with "*Water Productivity*" as the dependent variable and two independent variables, namely, "*CEO-to-average worker pay*" and "*% Women on board*." The overall model fit in the regression analysis in Table 4 shows that these two independent variables explain 31.4 percent of variance in the dependent variable - "*Water Productivity.*" The Durbin-Watson d = 1.846 is between the two critical values of $1.5 < d < 2.5$ and therefore one can assume that there is no first order linear auto-correlation in the multiple linear regression data. However, a cautionary note is in order as Pindyck and Rubinfeld (1976) and Asher (1976) suggest that ordinary least squares regression models do not indicate causality and may involve reciprocal causation between the dependent variable and the independent variables and propose the use of structural equations models with latent variables (Bollen, 1989; Kelloway, 1998). Despite this limitation, the multiple regression model improves our explanation of the variance in the dependent variable which is "*Water productivity.*" Moreover, "*Water productivity*" is an outcome variable and is not a managerial (discretionary) variable. Hence, it is rational to suggest that the independent variables in my study, namely, "*CEO-to-average worker pay*" and

"*% Women on board*" lead to the dependent variable – "*Water productivity*", and are not a result of "*Water productivity*."

**Table 4: Overall Model Fit[a]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .561[b] | .314 | .300 | 575769.64650 9830000000 | 1.846 |

a. Predictors: CEO-to-Average Worker_Pay, % Women on BOD, and [CEO-to-Average Worker_Pay*Women on BOD].
b. Dependent Variable: Water Productivity.

Table 5 shows the F-test; the linear regression's F-test has the null hypothesis that there is no linear relationship between the variables (in other words $R^2=0$). The F-test (F value of 20.983 in Table 5) is highly significant, thus one can assume that there is a linear relationship between the variables in our model. Taken together, tables 4 and 5 indicate the overall model examining the variance in "*Water Productivity*" as a function "*CEO-to-average worker pay*" and "*% Women on board*" is statistically significant. However, hypotheses 1 to 3 focus on the individual main effects and interaction effects of "*CEO-to-average worker pay*" and "*% Women on board*" on "*Water Productivity.*" The individual parameter estimates for these effects are shown in Table 6.

**Table 5: ANOVA[a]**

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 21156024255488 | 3 | 7052008085162 | 20.983 | .000[b] |
| Residual | 46042417129948 | 137 | 336076037444 | | |
| Total | 67198441385437 | 140 | | | |

a. Dependent Variable: Water Productivity.
b. Predictors: CEO-to-Average Worker_Pay, % Women on BOD, and [CEO-to-Average Worker_Pay*Women on BOD].

Table 6 shows the multiple linear regression estimates including the intercept and the significance levels. It also shows that the individual effects and the interaction effect of "*CEO-to-Average Worker Pay*" and "*% Women on Board*" are statistically significant at $p<0.01$ levels. That is, all three hypotheses stated above are supported. Simply stated, the higher the "*CEO-to-Average Worker Pay,*" the greater would be "*Water Productivity.*" Similarly, the higher the "*% Women on Board,*" the greater would be "*Water Productivity*."

However, the interaction effect between "*CEO-to-average worker pay*" and "*gender diversity in board of directors*" on "*water productivity at firm level*" is negative though statistically significant. This is an interesting empirical finding. What this means is that as "*CEO-to-average worker pay*" increases the effect of "*gender diversity in board of directors*" on "*water productivity at firm level*" decreases; and also as "*gender diversity in Board of Directors*" increases the effect of "*CEO-to-average worker pay*" on "*water productivity at firm level*" decreases. This is an interesting revelation of the dynamics between "*CEO-to-average worker pay*" and "*gender diversity in board of directors*" in the area of sustainability and deserves further research at a more granular level to uncover the reasons for the negative interaction between "*CEO-to-average worker pay*" and "*gender diversity in board of directors*." One pragmatic explanation of this negative interaction in the area of sustainability is that as more women join the board of directors, they present a countervailing force to mitigate the power of the CEO, and vice versa. Future research at a more granular level will unravel the right balance between these two forces at play in resource allocation in firm-level sustainability.

**Table 6: Regression Coefficients[a]**

| Regression Model | Unstandardized Coefficients | | Standardized Coefficients | *t* | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | -1136415.971 | 180240.331 | | -6.305 | .000 |
| CEO-to-Average Worker_Pay | 14145.282 | 1811.324 | 1.179 | 7.809 | .000 |
| %Women on BOD | 5739832.912 | 1035914.240 | .903 | 5.541 | .000 |
| [CEO-to-Average Worker_Pay *Women on BOD] | -69283.626 | 10907.346 | -1.286 | -6.352 | .000 |

a. Dependent Variable: Water Productivity.

### *C. Discussion*

First, it is interesting to note that the percent of women directors on corporate boards is positively correlated with water productivity. One implication of our findings is that having more women directors on corporate boards would push the firms toward greener practices at the firm level.

Second, the results also show that "*CEO pay/Average worker pay*" is positively correlated to water productivity. The implication of this finding is that CEOs who enjoy higher pay levels are more concerned about sustainability. Future research should unpack this curious correlation to reveal how pay skewness in hierarchy could lead to higher levels of water productivity. Manipulating the "*CEO pay/Average worker pay*" as a design variable to make firms greener is a recommended strategy for future research.

Third, the results show a statistically significant but negative coefficient for the interaction effect between "*CEO pay/Average worker pay*" and "*percent of women on corporate boards.*" This is an interesting finding that also suggests future research to understand the dynamics between these two variables in terms of their impact on firm-level sustainability efforts.

## V. Limitations and Future Research

There are several limitations of the current study I would like to highlight in the spirit of self-critique and also for identifying areas for future research. Industry effects are not included in our study, and I recommend that future studies replicate our study by including industry effects as part of the predictor variables. Likewise, the imperatives for each of the three measures in our study may be very contextual, that is, determined by factors such as the location of the plant (near a water source), the type of production function (manufacturing or service), the regulatory environment (EPA regulations), the resource availability (firm profitability and competition), firm strategy, competitive environment, etc. Future research may expand the scope of the study by including some other variables that represent the broader construct of sustainability, such as energy productivity, waste productivity, etc. "*Women directors on corporate boards*" is an intriguing variable, especially when seen as a contributing factor to firm-level sustainability. My study did not examine the professional backgrounds of the women directors, and future research should focus on that characteristic of women directors since those with engineering and other professional backgrounds would have significantly greater impact on firm-level sustainability practices. Future research could also develop specific sustainability levels of performance in other productivity measures not considered in my study. For example, following Tol (2009), one can assume that the damage from global emissions is $50 per ton carbon. Based on this simple quantification, future research studies could develop benchmarks for GHG productivity for various groups of firms. Another example is country-level comparisons that are empirically based on sustainability studies such as ours. Viscusi and Aldy (2003) performed a cross-country meta-analysis and concluded that the value of a statistical life in other countries is approximately proportional to the 0.6 power of per capita GDP. This implies a value of a statistical life for the U.S. of $6.3 million, for Brazil of $2.4 million, for Venezuela of $2.1 million, for China of $1.7 million, and for India of $1.3million (Arrow *et al*., 2012, p. 27). In today's particular context, capital cities such as Beijing and New Delhi and even smaller cities such as Flint, Michigan, are struggling with air pollution and water problems, key measures of sustainable environment.

## VI. Conclusion

My study is focused on a narrow measure of sustainability as measured by water productivity. While the results reveal interesting managerial variables that significantly impact water productivity, I believe that the study has implications for broader research on sustainability. Proponents of sustainable development advocate that economic development is intimately tied to environmental integrity and social equity. Increasingly, I see that many firms are now subject to intense public scrutiny with society's increasing environmental consciousness. In response, management research and conceptual thinking on ecological sustainability have expanded from a narrow focus on the concept of pollution control to a broader concept of being socially responsible that integrates environmental issues into functional considerations. The gains in firm-level water productivity work as motivators to tangibly demonstrate the determinants of corporate social

responsibility (CSR). My research findings provide empirical evidence that suggests specific ways to influence water productivity, and I believe that when extended to other measures of sustainability (energy productivity, waste productivity), understanding the drivers of sustainability at the firm level will improve sustainability practices. This is how growing empirical evidence adds to the development of reliable theories in practice.

## References

**Aiken, Leona S., Stephen G. West, and Raymond R. Reno.** 1991. *Multiple Regression: Testing and Interpreting Interactions*. Thousand Oaks, CA: Sage Publications.

**Arrow, Kenneth J., Partha Dasgupta, Lawrence H. Goulder, Kevin J. Mumford, and Kirsten Oleson.** 2012. "Sustainability and the Measurement of Wealth." *Environment and Development Economics*, 17(3): 317-53.

**Asher, Herbert B.** 1976. "Causal Modelling." Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-003. Beverly Hills, CA: Sage Publications.

**Bear, Stephen, Noushi Rahman, and Corinne Post.** 2010. "The Impact of Board Diversity and Gender Composition on Corporate Social Responsibility and Firm Reputation." *Journal of Business Ethics*, 97(2): 207-21.

**Bebchuk, Lucian Ayre, and Jesse M. Fried.** 2003. "Executive Compensation as an Agency Problem." *The Journal of Economic Perspectives*, 17(3): 71-92.

**Bernardi, Richard A., Susan M. Bosco, and Veronica L. Columb.** 2009. "Does Female Representation on Boards of Directors Associate with the 'Most Ethical Companies' List?" *Corporate Reputation Review*, 12(3): 270-80.

**Berrone, Pascual, and Luis R. Gomez-Mejia.** 2009. "Environmental Performance and Executive Compensation: An Integrated Agency-Institutional Perspective." *The Academy of Management Journal*, 52(1): 103-26.

**Bertrand, Marianne, and Sendhill Mullainathan.** 2001. "Are CEOs Rewarded for Luck? The Ones Without Principles Are." *Quarterly Journal of Economics*, 116(3): 901-32.

**Bollen, Kenneth A.** (1989). *Structural Equations with Latent Variables*. New York: John Wiley & Sons.

**Chinta, Ravi, Fiona Sussan, and Alan. Jin.** 2014. "Energy Consumption, Green-House Gases Emissions, Water Usage and Waste Practices: Evidence from Top Global 100 Firms in the Area of Sustainability." *Journal of Strategic Innovation and Sustainability*, 10(1): 49-63.

**Cordeiro, James J., and Joseph Sarkis.** 2008. "Does Explicit Contracting Effectively Link CEO Compensation to Environmental Performance?" *Business Strategy and the Environment*, 17(5): 304-17.

**Cosgrove, William J., and Frank R. Rijsberman.** 2000. "Challenge for the 21st Century: Making Water Everybody's Business." *World Water Council, Paris*. 149-56.

**Cosgrove, William J., and Frank R. Rijsberman.** 2014. *World Water Vision: Making Water Everybody's Business*. New York: Routledge.

**de Geus, Arie** 1997. *The Living Company*. Boston: Harvard Business School Press.

**Doppelt, Bob.** 2003. Leading Change toward Sustainability. Saltaire, UK: Greenleaf Press.

**Dow Jones Sustainability World Index.** 2014. http://www.sustainability-indices.com/ (accessed August 15).

**Dresner, Simon.** 2002. *The Principles of Sustainability*. London: Earthscan Publications.

**Edwards, Andres R.** 2005. *The Sustainability Revolution: Portrait of a Paradigm Shift*. Gabriola Island, Canada: New Society Publishers.

**Elgar, Edward.** 2008. "Sustainable Development and Free Trade, Institutional Approaches." In *Sustainable Water Trade under WTP Law*, ed. Shawkat Alam, 171–88. London and New York: Routledge.

**Elkington, John.** 1999. *Cannibals with Forks: The Triple Bottom Line of the 21st Century Business*. Oxford: Capstone Publications Ltd.

**Erkut, Sumru, Vicki W. Kramer, and Alison M. Konrad.** 2008. "Critical Mass: Does the Number of Women on a Corporate Board Make a Difference." *Women on Corporate Boards of Directors: International Research and Practice*, 222-32.

**Gabaix, Xavier, and Augustin Landier.** 2008. "Why has CEO Pay Increased so Much?" *The Quarterly Journal of Economics*, MIT Press, 123(1): 49-100.

**Galbreath, Jeremy.** 2011. "Are There Gender-Related Influences on Corporate Sustainability? A Study of Women on Boards of Directors." *Journal of Management & Organization*, 17(1): 17-38.

**Goktan, A. Banu.** 2014. "Impact of Green Management on CEO Compensation: Interplay of the Agency Theory and Institutional Theory Perspectives." *Journal of Business Economics and Management*, 15(1): 96-110.

**Heineman, Ben W.** 2008. *High Performance with High Integrity*. Boston: Harvard Business Press.

**Hilton, Steve.** 2003. "How Brands Can Change the World." *Journal of Brand Management*, 10(4): 370-77.

**Hitchcock, Darcy E., and Marsha L. Willard.** 2008. *The Step-by-Step Guide to Sustainability Planning: How to Create and Implement Sustainability Plans in Any Business or Organization*. London: Earthscan Publications Ltd.

**Hoekstra, Arjen Y., and Ashok K. Chapagain.** 2011. *Globalization of Water: Sharing the Planet's Freshwater Resources*. New York: John Wiley & Sons.

**ISO.** 2014. "About Us". http://www.iso.org/iso/about.htm (accessed August 15).

**Jaccard, James, and Robert Turrisi.** 2003. *Interaction Effects in Multiple Regression*, 2nd ed. Sage University Paper Series on Quantitative Applications in the Social Sciences, Vol. 72. Beverly Hills, CA: Sage Publications

**Jo, Hoje, and Yongtae Kim.** 2008. "Ethics and Disclosure: A Study of the Financial Performance of Firms in the Seasoned Equity Offerings Market." *Journal of Business Ethics*, 80(4): 855-78.

**Kelloway, E. Kevin.** 1998. *Using USREL for Structural Equation Modeling: A Researcher's Guide*. Thousand Oaks: CA, Sage Publications.

**Liao, Lin, Le Luo, and Qingliang Tang.** 2015. "Gender Diversity, Board Independence, Environmental Committee and Greenhouse Gas Disclosure." *The British Accounting Review*, 47(4): 409-24.

**Marketing Weekly News.** 2012. "Despite Proliferation of Green Products, Over Forty Percent of American Adults Believe the Movement is Just Getting Started." http://bi.galegroup.com/global/article/GALE%7CA293450994/97f47f8e56968c4de45db4b8750308fc (accessed August 15, 2014).

**McInerney-Lacombe, Nancy, Diana Bilimoria, and Paul F. Salipante.** 2008. "Championing the Discussion of Tough Issues: How Women Corporate Directors Contribute to Board Deliberations." In: *Women on Corporate Boards of Directors: International Research and Practice*, ed. Susan Vinnicombe, Val Singh, Ronald Burke, Diana Bilimoria and Morten Huse. 123–39.

**Molden, D., H. Murray-Rust, R. Sakthivadivel, and I. Makin.** 2003. "A Water-Productivity Framework for Understanding and Action." In *Water Productivity in Agriculture: Limits and Opportunities for Improvement,* ed. J. W. Kijne, R. Barker, and D. Molden. -1-18. Cabi Publishing.

**Nielsen, Sabina, and Morten Huse.** 2010. "The Contribution of Women on Boards of Directors: Going Beyond the Surface." *Corporate Governance: An International Review*, 18(2): 136-48.

**Pereira, Luis S., Ian Cordery, and Iacovos Iacovides.** 2012. "Improved Indicators of Water Use Performance and Productivity for Sustainable Water Conservation and Saving." *Agricultural Water Management,* 108: 39-51.

**Pindyck, Robert S., and Daniel L. Rubinfeld.** 1976. *Economic Models and Economic Forecasts*. New York: McGraw-Hill.

**Rappaport, Alfred.** 1999. "New Thinking on How to Link Executive Pay with Performance." *Harvard Business Review*. March-April.

**Reed, Mark S.** 2008. "Stakeholder Participation for Environmental Management: A Literature Review." *Biological Conservation*, 141(10): 2417-31.

**Storvik, Aagoth, and Mari Teigen.** 2010. "Women on Board." *The Norwegian Experience.* Friedrich Ebert Stiftung. Germany.

**Terjesen, Siri, Ruth Sealy, and Val Singh.** 2009. "Women Directors on Corporate Boards: A Review and Research Agenda." *Corporate Governance: An International Review*, 17(3): 320-37.

**Tol, Richard S. J.** 2009. "The Economic Effects of Climate Change." *Journal of Economic Perspectives,* 23(2): 29-51.

**Viscusi, W. Kip, and Joseph E. Aldy.** 2003. "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World." *Journal of Risk and Uncertainty*, 27(1), 5-76.

**Williams, Robert J.** 2003. "Women on Corporate Boards of Directors and Their Influence on Corporate Philanthropy." *Journal of Business Ethics*, 42(1): 1-10.

**World Commission on Environment and Development.** *Our Common Future.* 1987. New York: Oxford University Press.

*The Journal of Business Inquiry* 2017, 16, Issue 1 (Special Issue), 50-59
http:www.uvu.edu/woodbury/jbi/articles
ISSN 2155-4072

# Strategic Innovation at NASA: The Solution Mechanism Guide

*By* KATHRYN E. KEETON, ELIZABETH E. RICHARD, AND JEFFREY R. DAVIS*[1]

*Strategic innovation is vital for future success of business enterprising, including governmental entities. However, to embed strategic innovation within the structural fabric of an organization, sustainable strategic management must support and infuse strategic innovation across the organization. This paper details a strategic management process within NASA that established the pathway for a strategic innovation called the Solution Mechanism Guide (SMG). We propose that the SMG serve as a critical component of a larger theoretical framework in which strategic management successfully embeds strategic innovation and provides a template for other organizations to adopt and tailor to meet their specific needs.*

**Keywords**: Innovation, Knowledge Management, Open Innovation, Crowdsourcing

JEL Classification: O31

## I. Introduction

Strategic innovation is a fundamentally different way to compete and sustain success in an existing organization (Charitou and Markides, 2003). Indeed, its importance within organizations is increasing when considering the advancement of technology and the pace of change across industries as organizations continue to seek alternative ways to differentiate themselves from their competition (Berghman, 2012). Researchers have suggested that ambidexterity (defined as an organization's ability to reconcile conflicting demands in terms of resources, organization, and strategic focus that characterize exploitation versus exploration activities) plays a vital role in the success of an organization's ability to strategically utilize innovation internally (Tushman and O'Reilly, 1996; Christensen *et al*. 2002; Berghman, 2012). This also supports Tushman and Anderson's perspective on the importance of congruence between strategic management and strategic innovation approaches within an organization in order to be effective and successful (Tushman and Anderson, 1997).

Considering the concept of 'ambidexterity,' researchers have identified two specific approaches: structural and contextual ambidexterity. Whereas the structural approach builds on Duncan's (1976) argument that organizations need mechanistic structures for efficient exploitation but need organic ones for creative exploration, contextual ambidexterity focuses on the creation of an appropriate "context" (e.g., a stimulating culture) to achieve an exploration–exploitation balance (Berghman, 2012). Current research suggests that the use of an ambidexterity approach may be influenced by the project stage in order for strategic innovation to be successful

* Kathryn E. Keeton, corresponding author, CEO and Managing Partner, Minerva Work Solutions Business School, University of Texas. Email: kathryn.keeton@minervawise.com. Elizabeth E. Richard, Founder and Principal, EER Strategies, LLC. Email: elizabeth.richard@eerstrategies.com. Jeffrey R. Davis, Founder and CEO, Exploring 4 Solutions. Email: jeffdavis@exploring4solutions.com.

[1] Views expressed in this article are those of the authors and do not express the official views of NASA or the NASA Johnson Space Center.

(Berghman, 2012). Loose separation is characterized by extensive operational experiments in separate units that link to the broader organization and enable learning and borrowing between core and new businesses (Govindarajan and Trimble, 2004 and 2005).

To exemplify the effective interplay between strategic management and strategic innovation, we share the following case study that describes the successful design, development, and implementation of the Solution Mechanism Guide (SMG). The SMG is a critical knowledge management tool that successfully bridges strategic management and strategic innovation approaches within NASA, empowering employees to utilize innovation tools and platforms, thereby increasing the use of novel problem solving approaches within the organization itself. This case study exemplifies how the SMG further bolsters the ambidexterity of the organization from a loose separation structural approach proposed by Govindarajan and Trimble (2004 and 2005), and demonstrates that in order for strategic innovation to be effectively embedded into the structural fabric of an organization, sustainable strategic management must support and infuse strategic innovation across the organization.

## II. The Strategic Management Process: A Case Study

In 2005, NASA's Human Health and Performance (HH&P) Directorate grappled with a 45 percent reduction in its research and technology development (R&TD) budget. The directorate, comprising approximately 1,000 civil servant and contractor scientists, physicians, and engineers, faced the significant challenge of meeting its mission to optimize crewmember health and performance in space exploration with a dramatically reduced R&TD budget. In response, the HH&P leadership formulated a new strategy to build resilience into the organization and buffer future budget changes. This 2007 strategy charted a new course for the HH&P grounded in the pursuit of strategic alliances and other collaborative efforts with external partners to augment internal capabilities and resources, delineating strategic goals and objectives spanning twenty years (Richard *et al*., 2009). Goals focused on driving innovation in human health and performance through collaboration, with an emphasis on solutions that both meet NASA needs and benefit life on earth.

In 2007, the HH&P directorate began a two-year benchmark study with approximately twenty external organizations in academia, industry, and other government organizations to assess how best to identify and manage collaborative relationships. Benchmark results indicated that both the technical and human resources aspects of alliances needed to be managed and that partnerships must be established in order to achieve innovation goals among the organizations interviewed. Implementation of the strategy also resulted in the assessment of open innovation methodologies to provide technical solutions for diverse unmet technical challenges (Richard and Davis, 2007).

In mid-2009, the HH&P initiated four pilot projects in open innovation to pursue technical solutions through internet-based organizations that posted challenges to a diverse and non-traditional group of solvers. Thirty-four challenges (twenty internal to NASA and fourteen external to NASA) were conducted using different vendors acquired through an open competition providing open innovation platforms. Based upon the successful results from its initial pilots in open innovation, the HH&P procured long-term contracts with InnoCentive and yet2.com through an open competition (InnoCentive, 2010). A third platform (TopCoder) was made available when HH&P had an opportunity to participate in a Harvard research project. In addition, at the request of the White House Office of Science and Technology Policy (OSTP), NASA established the Center of Excellence for Collaborative Innovation (CoECI) in November 2011 to provide

education and assistance to other federal agencies in running open innovation prize competitions and to develop, collect, and report metrics (Davis *et al*., 2015).

## III. Strategic Innovation: The Solution Mechanism Guide (SMG)

Given NASA's proud history of advancing innovations internally or using grant funding and other traditional mechanisms to solve technical problems, the HH&P recognized a need to develop a tool that would utilize both existing and new methods of problem solving to effectively support sustainable strategic innovation and create a culture of collaborative innovation within the directorate. While initial efforts successfully paved the way to increase openness and acceptance of crowdsourcing platforms, a tool that could guide users to an optimal problem solving solution while simultaneously increasing their awareness and understanding of these novel problem solving methods was needed to achieve a culture that embraced collaboration.

To begin this project, a formal needs analysis was conducted to confirm the necessity for this type of tool. Interviews were carried out with individuals representing multiple technical areas of expertise across a range of focus areas including aerospace medicine, biomedical research and environmental sciences, and human systems engineering. Concurrently, a small benchmarking effort was initiated to examine how other organizations have implemented new process models of innovation, what barriers they encountered, what strategies they employed to address these barriers, and how they evaluated the success of utilizing these platforms (data from the initial benchmarking effort described above was also included). Results suggested strong agreement among HH&P technical experts that education, training, and resources (e.g., a prescriptive tool or guide) were needed in order to fully adopt these new methods, supporting initial feedback that was received from early adopters. In conjunction with these voiced needs, results from the benchmarking efforts indicated that improving communication, reducing known barriers, and providing needed support to employees in order to ensure innovative initiatives success were all critical factors to creating an organizational change or shift towards open innovation (Davis *et al.*, 2014). Altogether, these results provided a strong rationale for development of the SMG.

The SMG fully integrates the new resource methods available in collaboration and open innovation with traditional problem solving methods currently used by the HH&P, and provides users a unique hands-on experience so that they may learn and educate themselves about the diverse range of problem solving tools at their disposal. It serves as both a training and resource tool and acts as a catalyst to improve communication across the directorate, providing needed support for technical experts, and reducing known barriers (e.g., management buy-in). The result is to empower SMG users to make more informed decisions, and effectively drive cultural change within the directorate towards embracing open innovation and alternative problem solving methodologies (Davis *et al*., 2014).

## IV. Development and Design of the SMG (Alpha Version)

The design and content of the SMG were created with combined input from a small panel of experts who were specifically selected to represent the diverse range of technical expertise, background, and focus areas of the HH&P. Members spanned an array of management levels and technical disciplines within the directorate and consisted of both civil servants and contractors to ensure that a complete perspective was acquired to influence the design and content of the tool. Representatives from NASA's Legal and Procurement Offices were also included on the panel to

inform inclusion of specific solution mechanisms. The panel agreed to create this tool in phases to allow for the opportunity to obtain user feedback so that necessary changes could be made based on this input (i.e., fail early and often). Panel members met on a frequent basis to be able to quickly respond to feedback received and to reach consensus on key design and content aspects of the tool. Main functionality and features of the SMG focused on five distinct aspects:

1. **Filtering Mechanism:** users could narrow down possible mechanisms based on their needs/criteria (e.g., the SMG for solution mechanisms (similar to a travel search engine that compares alternative solutions for travel))
2. **Education Portal:** users could enjoy dual-functionality of the SMG, which is both a resource guide and learning tool
3. **Metrics Repository:** metrics for each solution mechanism are captured and tracked historically to determine effectiveness of the SMG over time
4. **Active Updating:** the SMG has a robust administrative capability so content can be easily updated, revised, etc. to ensure the most accurate and effective data is provided and to allow for customization by other groups, departments, centers, etc.
5. **Transfer of Training:** key resources (e.g., point of contact for each mechanism) are provided within the SMG so users can easily get started in implementing a specific solution mechanism by contacting an expert in that particular solution mechanism

The alpha version of the SMG (which included only one filtering question that categorized mechanisms based on the stage of development or maturity of the problem/research focus) was completed in the spring of 2013 followed by a first round of user evaluations. Focus groups were conducted and sixty persons from the HH&P participated. Users were able to try out the tools for themselves using a provided computer. After receiving a short overview, participants navigated the tool on their own. At the end of each session, participants completed an evaluation survey and provided feedback. Results indicated that users liked the overall look and feel of the tool (80 percent), found the tool easy to navigate and use (62 percent), felt that a lot of the information was new to them (58 percent), felt that the tool provided helpful information (74 percent), and thought that they would likely use this tool on the job (62 percent). These results were very encouraging and provided the needed evidence for the HH&P to move forward with developing a complete software tool for users (please see Figures 1-5).

**Figure 1: Overall Look and Feel of the SMG**

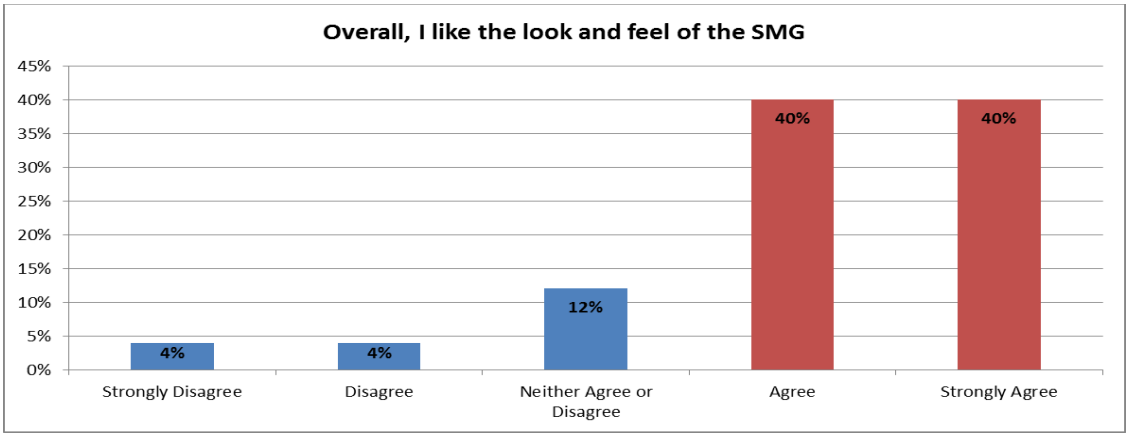


**Figure 2: Ease of Use with the SMG**

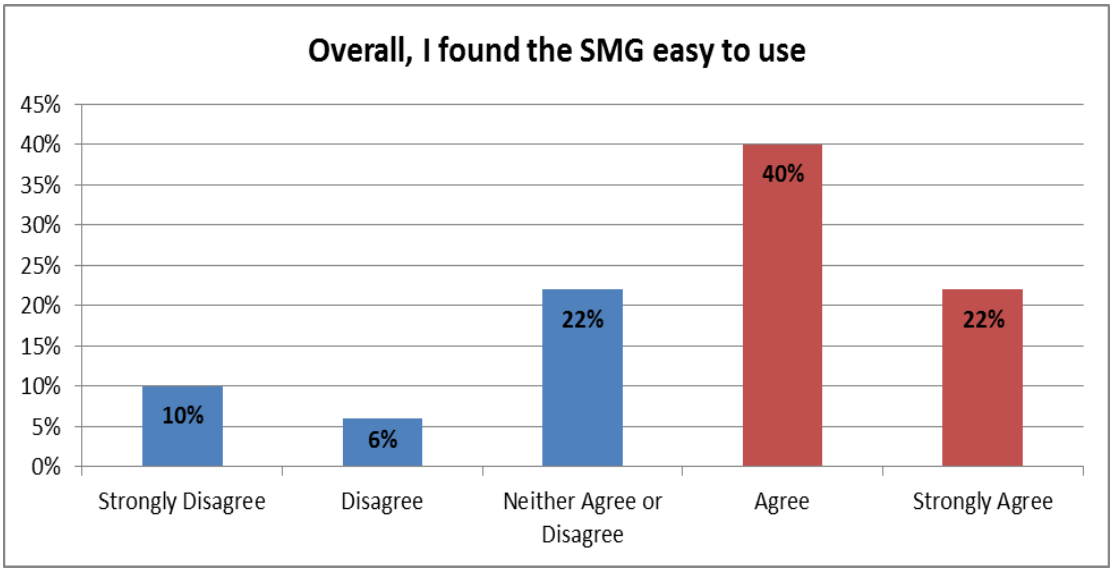



**Figure 3: New Information in the SMG**

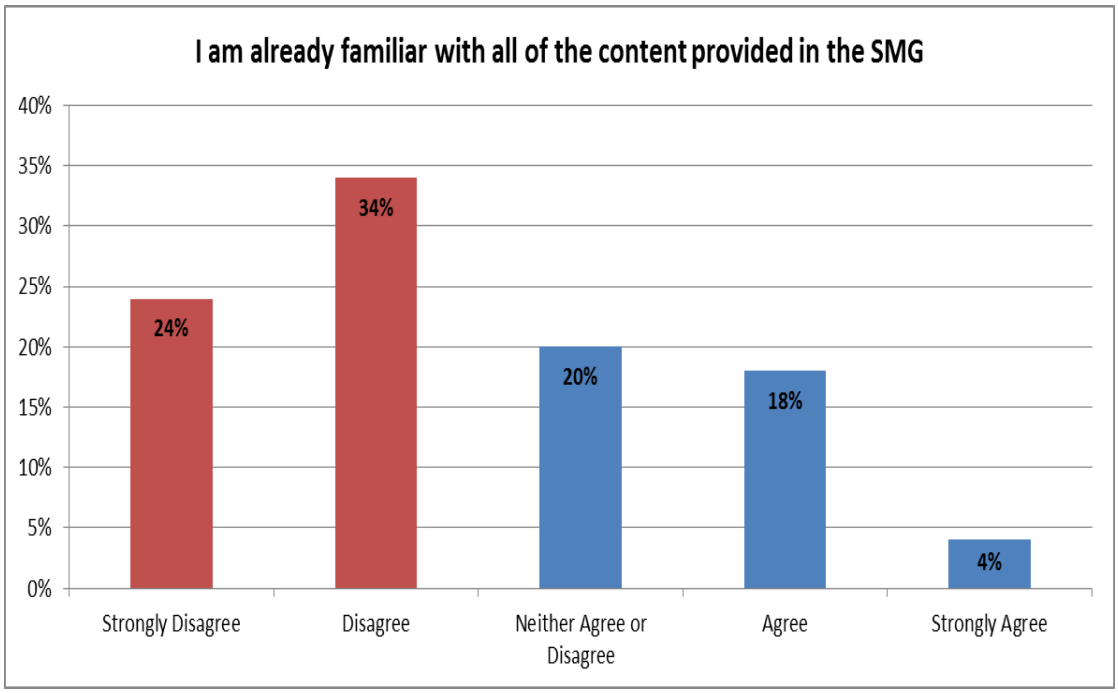


**Figure 4: The SMG Provides Helpful Information**

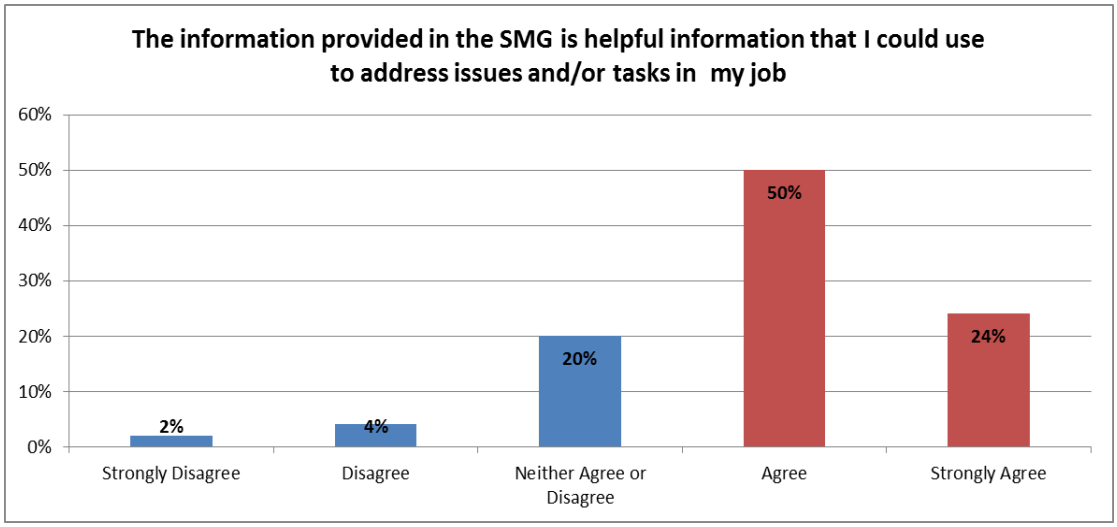
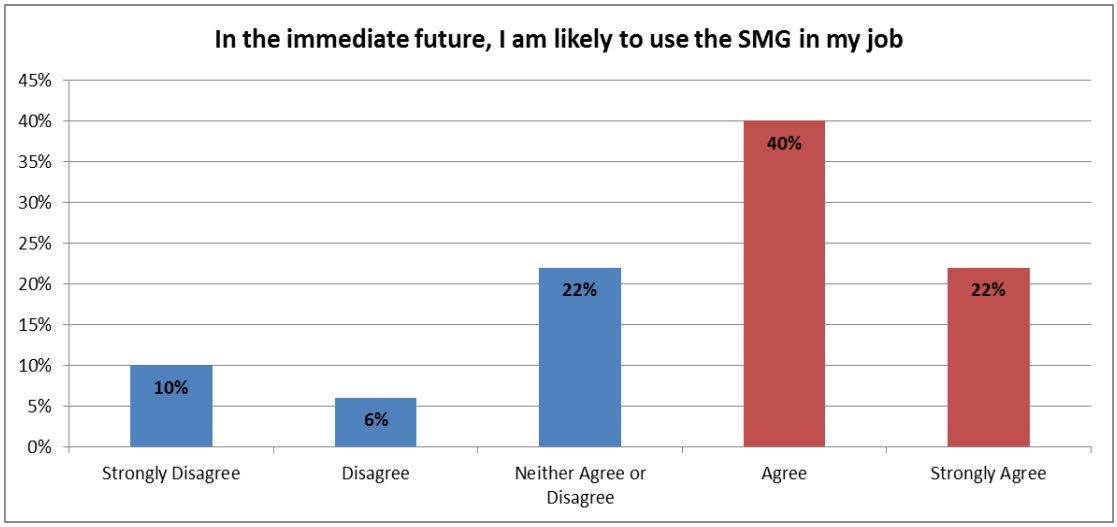



**Figure 5: Intentions to Use the SMG**




## V. Development and Design of the SMG (Beta Version)

Based on the positive feedback that was received from user evaluations of the alpha version of the SMG, funding was secured to develop the beta version of the tool. The beta version of the SMG includes full software functionality with both a filtering feature (the administrator can determine which questions to filter possible mechanisms), as well as a resource/education feature (where new users can learn about the tool and interesting topics related to the tool) and a robust administrative portal, allowing for real-time updates and/or changes to the tool as needed. The SMG also features a "compare" feature that allows the direct comparison of the features of up to four solution mechanisms. Beta development of the SMG began in January 2014 and was

completed by July 2014 through a series of development challenges launched from the TopCoder platform (in total, 23 contests were run including 359 registrants from thirteen different countries, with 99 submissions).

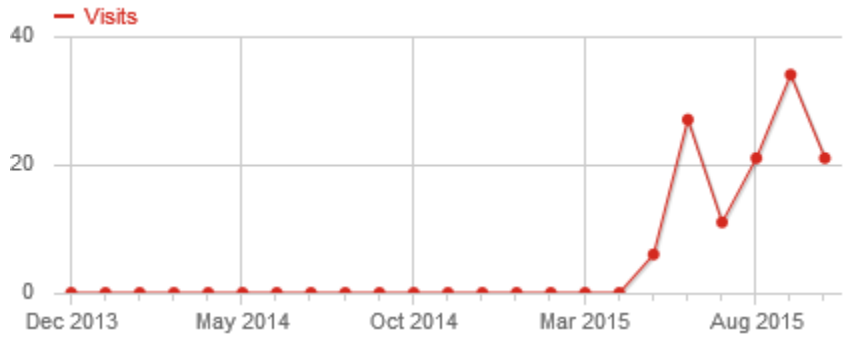
A second evaluation within the HH&P Directorate was completed over the fall and winter of 2014. In total, over 90 individuals participated and provided feedback after rigorous testing of the tool. Whereas the first evaluation was focused more on the utility and usefulness of the concept and the design of the SMG itself, this second evaluation focused more on identifying bugs, issues, and/or problems with the tool that needed to be addressed before full implementation within HH&P. In total, six major bug fix requests were gleaned from this evaluation and were elevated to TopCoder to be fixed. These identified issues were addressed, and the SMG was made ready for launch over the summer of 2015.

## VI. Implementation of the Solution Mechanism Guide

The SMG was officially launched within the HH&P Directorate in the fall of 2015. HH&P uses Piwik, an open source website tracking application, to provide data on the number of users that visit the SMG site and its different pages. In addition, the SMG contents itself contains a characteristic that captures the number of a specific mechanism currently in place (e.g., six Space Act Agreements, ten grants, etc.). This data serves as a baseline for each mechanism, and these numbers can be updated and tracked over time to inform how usage of mechanisms may change due to the use of the SMG (i.e., essentially providing an 'effectiveness' indicator of the SMG).

The SMG was officially launched in July 2015 within HH&P at a formal directorate-wide employee event. Since this official launch, the SMG has received a growing number of hits to the site, and early traffic (pre-marketing) numbers are showing promise and growth.

**Figure 6: Piwik Analytic Data: Hit Sites to the SMG Website**




Since summer 2015, one-on-one evaluations have been conducted within the HH&P Directorate for an emerging leadership team at NASA Headquarters, and by the Strategic Partnerships Office at the NASA Johnson Space Center. Overwhelming positive feedback has been received (and captured from a feedback survey that was administered) from all of these evaluation efforts. Out of the surveys completed, the majority of participants agreed that the SMG provided information not previously known, and would be useful on the job; they anticipated using the SMG if given access (these findings concur with previous results from the first phase evaluation effort described above).

The one-on-one evaluations within the HH&P targeted the diverse areas that comprise this directorate, and participants represented these areas including operations, hardware, research, and medicine. These participants provided real scenarios/problems from their work areas to assess how the SMG might inform project management decisions. Participants were able to review how the SMG would provide insight into available mechanisms given the specific criteria of their problem/issue, and at the same time these users were able to provide real-time feedback to the developers about possible improvements and/or comments for consideration.

## VII. The HH&P Strategic Innovation Framework

In her 2012 empirical study, Berghman discusses various structural designs for strategic innovation in the literature, comparing separation and integration designs with structural and contextual ambidexterity strategies. The appropriate ambidexterity approach may differ both by innovation type and by the phase of the innovation project. Smith *et al*. (2008) concluded that organizational structure is a critical factor in innovation management, and that organizational culture is a key factor that impacts all other factors and is impacted by the others, continuously developing and evolving during the strategic innovation process.

The structural ambidexterity strategy follows the classical organizational design argument that efficiency and effectiveness goals each require different structures (Burns and Stalker, 1961). It builds on Duncan's (1976) argument that organizations need mechanistic structures for efficient exploitation but organic ones for creative exploration. This view is further advanced by Tushman and Anderson (1997). Due to this irreconcilability, the structural ambidexterity approach proposes to physically separate exploration from exploitation activities in an organization. More recently, Govindarajan and Trimble (2005) advanced a loose separation strategy, where the separate innovation unit maintains strong links to the core organization. Even though the new organization may be geographically isolated from the established business, operational links enable the innovation unit to borrow core assets. According to Govindarajan and Trimble (2005), the "dual-purpose organization" possesses the ideal characteristics for strategic innovation.

The HH&P designed, developed, and implemented the SMG using a strategic innovation strategy that is best described by Govindarajan and Trimble's (2005) loose separation structural ambidexterity strategy. The concept for this knowledge management tool was grounded on the need to create a culture of collaborative innovation in an organization that historically innovated internally or via collaborations with known institutions using traditional grant funding mechanisms. We posit that this congruence between the strategic management and strategic innovation within this project strongly influenced its success (both past and present).

The directorate established a Strategic Planning and Execution (SP&E) group separate from the technical organizations responsible for advancing technology innovations within the HH&P. This new innovation unit advanced the concept and managed the development of the SMG tool, but developed the tool by working closely with the core technical divisions and support organizations through all stages of developing and testing. The collaborative effort enabled an iterative process that involved the end users from the earliest phase of development through testing to encourage adoption and diffusion of the innovation across the technical organization. This innovation strategy is best described as "disruptive" by Pisano (2015), who defines it as one that requires an organization to change its business model, but uses existing technical competencies to innovate. Establishing the SP&E group exemplified the new business model, while the SMG was developed by a collaborative effort that relied on existing technical competencies.

## VIII. Conclusions

This paper highlights a case study of strategic and sustainable innovation, tracks the chronological development of the SMG, and demonstrates its congruence with a loose separation, structural ambidexterity approach. To successfully implement and utilize crowdsourcing, and thereby create a culture of collaborative innovation, NASA needed to increase awareness about crowdsourcing platforms and about which are best for a particular problem, providing a tool that empowers employees to select the mechanism that best fits their particular project needs. The SMG addresses all of these requirements, exemplifying strategic innovation in support of the strategic management process grounded in the strategy for the HH&P Directorate. Establishment of a separate innovation unit, the SP&E group, facilitated the success of this effort by working closely with the core technical groups of the directorate.

This strategic management process outlines a successful path of development for tools needed to promote the use of crowdsourcing mechanisms. Our approach encouraged a fairly rapid development process, facilitating multiple fine-tuning opportunities of needs and requirements and ensuring that the final product was a true representation of the needs presented by our users. It incorporated feedback from the technical core group at critical touch points along the development path, promoting buy-in and increased awareness of the benefits the tool offered. Once implemented, tracking the usage of the SMG via Piwik Analytics allows for an objective evaluation of its effectiveness over time.

In sum, the HH&P used Govindarajan and Trimble's (2005) structural, loose separate ambidextrous organizational strategy for the systematic creation of the SMG. It is also aligned with Pisano's (2015) disruptive innovation strategy. The tool enables new organizational capabilities by adopting a new business model while relying on existing technical capabilities to develop it, advances sustainable innovation across the organization, and promotes a culture of collaborative innovation. We hope this approach inspires other organizations to find their own pragmatic approach in using strategic management to successfully drive strategic innovation.

## References

**Berghman, Liselore Ann.** 2012. "Strategic Innovation in Established Companies: An Empirical Study of Appropriate Ambidexterity Strategies." *International Journal of Innovation Management*, 16(1): 1-30.

**Burns, Tom, and G.M. Stalker**. 1961. *The Management of Innovation*. London: Tavistock Publications.

**Charitou, Constantinos D., and Constantinos C. Markides**. 2003. "Responses to Disruptive Strategic Innovation." *MIT Sloan Management Review*. http://sloanreview.mit.edu/article/responses-to-disruptive-strategic-innovation/.

**Christensen, Clayton M., Mark W. Johnson, and Darrell K. Rigby**. 2002. "Foundations for Growth: How to Identify and Build Disruptive New Businesses." *MIT Sloan Management Review*, 43(3): 22-31.

**Davis, Jeffrey R., Elizabeth E. Richard, and Kathryn E. Keeton**. 2015. "Open Innovation at NASA - A New Business Model for Advancing Human Health and Performance Innovations." *Research-Technology Management,* 52-8. http://insurancenewsnet.com/oarticle/open-innovation-at-nasa-a-new-business-model-for-advancing-human-health-and-performance-innovations.

**Davis, Jeffrey R., Elizabeth E. Richard, Kathryn E. Keeton Keeton, and Mary C. McFather**. 2014. "The Human Health and Performance Directorate: A Comparative Analysis of Innovation within an Organization, Research and Technology Development Report." In NASA Johnson Space Center. 8-9. www.nasa.gov/sites/default/files/files/2014_Final_Rev1.pdf.

**Duncan, Robert**. 1976. "The Ambidextrous Organization: Designing Dual Structures for Innovation." In *The Management of Organization*, ed. Ralph H. Killman, Louis R. Pondy and Dennis P. Slevin. 1: 167-88. New York: North Holland.

**Govindarajan, Vijay, and Chris Trimble**. 2004. "Strategic Innovation and the Science of Learning." *MIT Sloan Management Review*, 45(2): 67-75.

**Govindarajan, Vijay, and Chris Trimble**. 2005. "Organizational DNA for Strategic Innovation." *California Management Review*, 47(3): 47-76.

**InnoCentive**. 2010. "InnoCentive Investigation of the Challenge Driven Innovation Platform at NASA: An Evaluation of the Open Innovation Pilot Program Between NASA and InnoCentive, Inc." InnoCentive Report. http://www.nasa.gov/pdf/572344main_InnoCentive_NASA_PublicReport_2011-0422.pdf.

**Keeton, Kathryn E., Elizabeth E. Richard, and Jeffrey R. Davis**. 2014. "Solution Mechanism Guide: Implementing Innovation within a Research & Development Organization." *Aviation, Space, and Environmental Medicine,* 85(10): 1061-62.

**Pisano, Gary P**. 2015. "You Need an Innovation Strategy." *Harvard Business Review*, 45-54.

**Richard, Elizabeth E., and Jeffrey R. Davis**. 2007. NASA Space Life Sciences Strategy for Human Space Exploration. https://www.nasa.gov/sites/default/files/atoms/files/nasa_space_life_sciences_strategy_2007.pdf.

**Richard, Elizabeth E., Steven A. González, Jeffrey R. Davis, and David C. Leestma**. 2009. "Strategic Alliances: Strategies and Processes Benchmarking Study." NASA Johnson Space Center. https://www.nasa.gov/sites/default/files/atoms/files/strategic_alliances_strategies_and_processes_benchmarking_study_2009.pdf.

**Smith, Marisa**, **Marco Busi, and Peter Ball.** 2008. "Factors Influencing an Organisation's Ability to Manage Innovation: A Structure Literature Review and Conceptual Model." *International Journal of Innovation Management*. 12(4): 655-76.

**Tushman, Michael L. and Charles A. O'Reilly**. 1996. "Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change." *California Management Review*, 38(4): 8-30.

**Tushman, Michael L., and Philip Anderson**. 1997. *Managing Strategic Innovation and Change*. New York: Oxford University Press.

*The Journal of Business Inquiry* 2017, 16, Issue 1 (Special Issue), 60-87
http:www.uvu.edu/woodbury/jbi/articles
ISSN 2155-4072

# Corporate Sustainability: Theoretical and Integrated Strategic Imperative and Pragmatic Approach

*By* ZABIHOLLAH REZAEE*

*Corporate sustainability has become an economic and strategic imperative with the potential to create opportunities and risks for businesses. The tension and possible link between economic sustainability performance (ESP) and non-financial environmental, social, and governance (ESG) sustainability performance have been extensively yet inconclusively debated in business literature. This paper attempts to fill this void by proposing a framework consisting of four integrated strategies of the sustainability theory integration, sustainable shared value creation, continuous performance improvements, and sustainability performance reporting and assurance. Propositions are advanced for each of these four strategies in promoting future sustainability research.*

**Keywords**: Sustainability Performance, Managerial Decision-Making, Shared Value Creation, Integrated Sustainability Reporting and Assurance

JEL Classification: M12, M14, M38, M48

## I. Introduction

In today's business environment, global businesses are under close scrutiny and profound pressure from lawmakers, regulators, the investment community, and their diverse stakeholders to focus on sustainability performance (Rezaee, 2015). In recent years, corporate sustainability has evolved from the focus on promoting corporate social responsibility (CSR), and environmental, social and governance (ESG) performance to sustainability initiatives that can drive revenue growth and high quality financial performance (International Federation of Accountants, 2015).[1] Corporate sustainability has recently advanced to the central stage of business strategies, and business scholars now consider CSR as a component of corporate sustainability (Kiron *et al*., 2015; Ng and Rezaee, 2015; Jain *et al*., 2016; Rezaee, 2016). In this evolving and highly opaque field of corporate sustainability (Wijen, 2014), where the relation between financial economic

* Zabihollah Rezaee, Ph.D, Thompson-Hill Chair of Excellence and Professor of Accountancy, Fogelman College of Business and Economics, 300 Fogelman College Administration Building, University of Memphis, Memphis, TN 38152-3120. Phone: (901) 678-4652. Fax: (901) 678-0717. Email: zrezaee@memphis.edu.

[1] The terms business sustainability, corporate social responsibility (CSR), and triple bottom line of focusing on environmental, social, and governance (ESG) have been interchangeably used in the literature and authoritative reports. Rezaee (2015) and Brockett and Rezaee (2012) define sustainability as the process of focusing on the achievement of financial economic sustainability performance (ESP) in creating shareholder value while recognizing the importance of environmental, social, and governance (ESG) performance in protecting the interests of other stakeholders. Nidumolu *et al.* (2015, p. 3) argue that at its core sustainability is "about protecting and strengthening foundations for long-term success" by "being farsighted and planning ahead" in order to "minimize social and environmental harm, while maximizing business opportunity" in creating stakeholder value. Tonello and Singer (2015a: 1) define corporate sustainability as "the pursuit of a business growth strategy by allocating financial or in-kind resources of the corporation to ESG practices."

sustainability performance (ESP) and non-financial ESG sustainability performance may be viewed as complementing/completing or conflicting/competing (Rezaee, 2015 and 2016),[2] where sustainability guidelines for the most part are still voluntary (Gilbert *et al*., 2011; Rezaee, 2016), and while there are a number of divergent sustainability theories (Aguilera *et al*., 2007; Starik and Kanashiro, 2013), there is a need for a strategic imperative and pragmatic approach to corporate sustainability.

This paper presents a framework for a strategic imperative and pragmatic approach in managing sustainability performance and provides an integrated and holistic approach to corporate sustainability performance and reporting. The proposed framework is composed of four integrated strategies of sustainability theory implication, shared value creation, continuous sustainability performance improvements, and sustainability performance reporting and assurance as illustrated in Table 1 and explained in the following sections.[3] Propositions are advanced for each of these four strategies in promoting future research in sustainability. The relevance and implications of the proposed sustainability framework to business organizations and future research are also presented.

Following this introduction, Section II reviews sustainability literature, which suggests that existing literature is not adequately addressing tensions among dimensions of sustainability performance. The four strategies of theory implication, shared value creation, continuous performance improvements, and sustainability performance reporting and assurance are examined in sections III to VI respectively. The last section concludes the paper, including a discussion on policy and managerial and academic implications of corporate sustainability with suggestions for future research.

[2]Ng and Rezaee (2015) define ESP as a long-term sustainable financial performance measured in terms of accounting-based measures (return on equity, sales), market-based measures (stock returns, market-book value), and long-term investments (R&D and advertising).

[3]Much of the discussion of the proposed framework comes from Rezaee (2016).

## Table 1: An Integrated Sustainability Framework

| Stakeholders | Capitals | Risks | Performance | Shared Value | Actions | Sustainability Initiatives | Sustainability Theories | Sustainability Reporting/ Assurance |
|---|---|---|---|---|---|---|---|---|
| Management | Strategic Capital | Failure | Purpose/Mission | Strategic planning | Management performance | Long-term strategic decisions reporting | Stewardship | Management discussion & analysis |
| Shareholders | Financial Capital | Financial | Economic/ financial | Create shareholder value | Improve market and accounting performance, earnings, growth, R&D investment | Management fiduciary duty is to create shareholder value. | Agency/ Shareholder | Financial statements and audit reports |
| Governance Participants | Human Capital | Strategic/ Operational | Governance | Effective governance and ethical culture | Independent board, board committees, executive compensation, internal controls | Management should design and implement effective corporate governance measures to protect stakeholder interests. | Shareholder/ Stakeholder | Governance reports and assurance |
| Society | Social Capital | Reputation | Social | Corporate Social Responsibility | Customer satisfaction, work environment, corporate giving | Management should invest in corporate social responsibility (CSR) activities that create good brand, image and reputation. | Legitimacy/ Signaling | Social reports and assurance |
| Environment | Compliance/Regulatory Capital | Compliance | Environmental | Leave a better environment for the next generation | Understanding of complex climactic dynamics, compliance with environmental laws | Management should comply with all applicable environmental laws, rules, regulations, and best practices to mitigate environmental risks. | Institutional | Environmental reports and assurance |

This study contributes to the sustainability literature in several ways: First, this paper is an attempt to reconcile the perceived conflict between achieving financial ESP to create shareholder value and achieving non-financial ESG sustainability to protect the interests of other stakeholders. Second, there are four integrated themes of the suggested sustainability framework which enable organizations to take their sustainability initiatives from the current greenwashing and publicity stage to the top of the agenda for their directors and executives to integrate into their corporate culture, infrastructure, and business models. The first theme posits that the business sustainability framework and its sustainability performance dimensions are driven by and built on stakeholder and stewardship theories, while other theories (shareholder, legitimacy, signaling, and institutional) are relevant in providing justification for engaging in sustainability performance and reporting sustainability information. The second theme indicate**s** that the main goal and objective function for business organizations is to create shared value for all stakeholders by maximizing firm value. The goal of firm value maximization can be achieved under business sustainability by protecting the interests of all stakeholders including investors, creditors, suppliers, customers, employees, the environment, and society. The third theme is the time horizon of balancing short-term and long-term performance in all dimensions of sustainability performance. The final theme is the multidimensional nature of sustainability performance. The relative importance of the financial ESP and non-financial ESG dimensions of sustainability performance with respect to each other and their contribution to shared value creation is affected by whether these sustainability performance dimensions are viewed as competing with, conflicting with, or complementing each other. The multidimensional sustainability performance is interrelated and should be integrated into business models and management processes and reporting in creating shared value for all stakeholders.

The third contribution of this paper is that management can use the proposed framework in integrating both financial and non-financial sustainability performance dimensions into its business model, managerial processes, and reporting from purchasing and inbound logistics, production design, manufacturing processes to distribution, outbound logistics, customer services, and social and environmental initiatives. Corporate sustainability has advanced from a main focus on corporate social responsibility (CSR) and corporate governance to integration into corporate culture, mission, strategy, business model, and management processes and reporting. A recent research conducted by *MIT Sloan Management Review*, the Boston Consulting Group, and the United Nations Global Compact (UNGC) suggests that business sustainability is moving away from isolated and opportunistic efforts with a main focus on CSR and toward a more integrated, holistic, and strategic approach embracing all dimensions of sustainability performance and engaging diverse stakeholders (Kiron *et al*., 2015). Thus, business organizations and their boards of directors and executives can use the proposed sustainability framework to advance corporate sustainability from its current status of branding and greenwashing to the strategic imperative of integrating sustainability into the business model and corporate culture in creating shared value for all stakeholders. Investors can benefit from the proposed sustainability framework as they consider various dimensions of financial ESP and non-financial ESG in their investment decisions.

Fourth, future research can use the framework and its propositions in studying the joint and integrated effects of financial and non-financial sustainability performance on management decisions (operating, investing, and financing), financial and market attributes (stock prices, return on investment, and cost of capital), corporate governance measures (board of directors characteristics, executive performance, and compensation), risk assessment and management, and the corporate reporting process. The proposed sustainability framework attempts to reconcile the

perceived conflict between achieving sustainable financial ESP in creating shareholder value and achieving non-financial ESG sustainability in protecting the interests of other stakeholders, which provides the much needed theoretical foundation for the development of research hypotheses in testing the possible link between financial and non-financial dimensions of sustainability performance. While the extant literature has contributed to our understanding of the drivers of CSR and its effect on financial and market performance and firm value, it is often conducted in an isolated fashion and thus does not reflect the integrated impacts of financial ESP and non-financial ESG sustainability performance measures. Therefore, there are numerous research opportunities in sustainability, including corporate governance, environmental sustainability, sustainable supply chain management, sustainability in education, sustainability in economic, social, ethical, governance, and cultural contexts, sustainability policy and practices, integrated reporting on sustainability performance, assurance on sustainability reporting, and the role of policymakers, who are standard-setters in the advancement of corporate sustainability.

Finally, the proposed sustainability framework can be used by academics in integrating corporate sustainability education into the curriculum of business and law schools. Despite the importance of corporate sustainability to corporations, investors, and the business community worldwide, there is limited research on the status of corporate sustainability education. Rezaee and Homayoun (2014) examine the coverage of sustainability education and find that as demand for and interest in sustainability education has increased in recent years, more business and law schools are planning to provide such education. The coverage of sustainability education topics in a separate course or their integration into existing business and law courses includes the discussion of both financial ESP and non-financial ESG dimensions of sustainability performance and related theories, standards, and risks discussed in this paper. The use of the module approach to sustainability education enables instructors to customize their syllabi by promoting critical thinking and the flexibility to cover all aspects of corporate sustainability in their course.

## II. Institutional Background and Literature Review

### *A. Institutional Background*

The term sustainability or sustainable development was first defined in the Brundtland Report in 1987 as "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission on Environment and Development, 1987, p. 43).[4] Business sustainability is a relatively new concept, which has been defined as "the pursuit of a business growth strategy by allocating financial or in-kind resources of the corporation to ESG practices." (Tonello and Singer, 2015b, p. 1), and which is basically a process of focusing on the achievement of all five EGSEE (economic, governance, social, ethical, and environmental) dimensions of sustainability performance (Brockett and Rezaee 2012; Rezaee 2015). In this context, sustainability focuses on activities that generate financial economic and non-financial ESG sustainability performance through maximizing corporate governance

[4] This definition is criticized for not being adequately specific about whose or which needs should be addressed, and it focuses primarily on environmental sustainability (Starik and Kanashiro, 2013).

effectiveness and business opportunities and minimizing environmental and social harms, and, above all, securing long-term success in creating stakeholder value.[5]

Corporate sustainability is advancing from greenwashing and branding to a business imperative as high-profile global companies employ sustainability development in creating opportunities for business growth, innovating new products and services, and generating revenue. International businesses and global investors utilize sustainability performance information and look beyond a company's financials in making business and investment decisions (Rogers, 2015), and about three quarters of investment professionals use ESG performance information when making investment decisions (CFA Institute, 2015). A recent research conducted by *MIT Sloan Management Review*, the Boston Consulting Group, and the United Nations Global Compact (UNGC) suggests that business sustainability is moving away from isolated and opportunistic efforts with a main focus on CSR and toward a more integrated, holistic, and strategic approach embracing all dimensions of sustainability performance and engaging diverse stakeholders (Kiron *et al*., 2015).

A new report indicates that global business organizations are expected to "take responsibility for a broader range of sustainability issues, such as social and environmental aspects that will ultimately affect financial performance and an organization's ability to create value over time" (International Federation of Accountants, 2015, p. 3). Global investors consider various dimensions of sustainability performance in their investment analysis, as socially responsible investing (SRI) has increased by more than 22 percent to $3.74 trillion in managed assets during the 2010–2012 period (Social Investment Forum, 2012). Stock exchanges worldwide either require or recommend that their listed companies report sustainability information (e.g., Singapore Stock Exchange, 2011; Toronto Stock Exchange, 2014; Hong Kong Stock Exchange, 2015), and more than 6,000 European companies will be required to disclose their non-financial ESG sustainability performance and diversity information for their financial year 2017 (European Commission, 2014).

The 2013 United Nations study suggests that non-financial ESG dimensions of sustainability performance are as important as financial performance, and thus they are value-relevant to investors, presenting new risks and opportunities when assessing portfolio investment valuation (United Nations Global Compact, 2013). Business sustainability has recently drawn the attention of corporate directors and executives, as evidenced by the recent UNGC report where a high majority (87 percent of 3,795 surveyed managers) agree that boards should play a strong role in sustainability development, whereas only 42 percent report that their boards actually were engaged in business sustainability, and 90 percent agree that executives should address sustainability challenges (Kiron *et al*., 2015). However, a recent survey reveals that the majority of investors are dissatisfied with currently disclosed sustainability information regarding the recognition of sustainability-related financial risks and opportunities (82 percent), comparability of sustainability reporting (79 percent), and the relevance and implications of sustainability risks (74 percent) (PricewaterhouseCoopers, 2015). Another survey conducted by KPMG in 2015 of the largest 100 companies in 45 countries indicates that about three in five companies worldwide included non-financial ESG sustainability performance information in their annual reports in 2014, compared with only one in five in 2011 (KPMG, 2015). The 2016 survey of global investors suggests that

[5] The Global Reporting Initiative (GRI) in its G4 sustainability guidelines promotes an integrated reporting on these five economic, governance, social, ethical, and environmental (EGSEE) dimensions of sustainability performance with the ethical dimension being incorporated into other dimensions (Global Reporting Initiative, 2013).

more than 75 percent of investment firms take into consideration ESG sustainability performance in making investment decisions (Unruh *et al*., 2016).

### *B. Literature Review*

Much of the academic literature has focused on CSR and its drivers, performance, and impacts on financial operations and earnings. However, as stated by Rehbein (2014), the role that management plays in determining CSR investment and drivers as a subset of business sustainability deserves more academic inquiry. This paper views CSR as an integral component of business sustainability. This view is shared by other researchers (e.g., Ng and Rezaee, 2015; Rezaee, 2015; Khan *et al*., 2016), and thus the remainder of this section focuses on reviewing several streams of research relevant to corporate sustainability theories, standards, performance, reporting, and assurance as summarized in Table 2.

The first two columns of Table 2 provide a synopsis of the related research relevant to sustainability theories and standards. Studies in this area examine the theoretical framework and related standards for corporate sustainability and their implications for policymakers, practitioners, and researchers. For example, Carter and Easton (2011) and Connelly *et al.* (2011) suggest the use of multiple theories of shareholder, stakeholder, institutional, signaling, legitimacy, and stewardship in analyzing the link between sustainability performance and managerial processes including supply chain management. These multiple theories and their applications to corporate sustainability performance, reporting and assurance are discussed in detail in Section III. Foerstl *et al*. (2015) identify five interdependent contextual drivers of sustainability which are grouped to stakeholder-related drivers, process-related drivers, and product-related drivers. Several other related studies discuss the role of the International Organization for Standardization (ISO) standards including the applications of several ISOs (9000, 14000, 20121, 26000, 27001, 31000) to corporate sustainability as presented in Section IV. For example, Rondinelli and Vastag (2000), Bansal and Hunter (2003), and Potoski and Prakash (2005) point out that the use of ISO certifications can promote compliance with best practices of CSR and environmental regulations. Furthermore, Ioannou and Serafeim (2012) develop an annual composite corporate social performance (CSP) index for companies using provisions of many of these ISOs.

**Table 2: Synopsis of Sustainability/CSR Research**

| Theories | Standards | Managerial Strategic Performance | Risk/Cost of Capital | Firm Value | Reporting/ Assurance |
|---|---|---|---|---|---|
| This stream of research consists of Connelly *et al*. (2011); Carter and Easton (2011); Tolbert and Zucker (1996); Agle *et al*. (2008); Campbell (2007); Garvare and Johansson (2010); Freeman *et al*. (2004); Meyer and Rowan (1977); Grinblatt and Hwang (1989); Patten (1992); and Lindblom (1994) focus on the theoretical framework for sustainability and its implications for management, financial reporting, and supply chain management. | Several studies address sustainability standards including Rondinelli and Vastag (2000); Bansal and Hunter (2003); Potoski and Prakash (2005); and Seuring and Müller (2008). These studies suggest that certifications to various ISO standards can promote compliance with environmental regulations and social standards. | Some of studies are: Barnett (2012); Spicer (1978); Dhaliwal *et al*. (2011); Rao and Holt (2005); Schreck (2011); Wu and Shen (2013); Bansal and McKnight (2009); Luchs *et al*. (2010); Carter and Easton (2011); and Fawcett and Waller (2011). Taken together these studies report a U-shaped relationship between financial and non-financial (CSR) dimensions of sustainability performance. | Studies on the link between various dimensions of sustainability performance and cost of capital are conducted in an isolated fashion and conclude that all five EGSEE dimensions of sustainability performance, on average experience a reduction in their risk of information asymmetry and thus a lower cost of capital. These studies are: Dhaliwal *et al*. (2011); El Ghoul *et al*. (2011); Cheng *et al*. (2013); Goss and Roberts (2011); Bouslah *et al*. (2013). | Prior research provides contradictory evidence of the impact of non-financial ESG sustainability performance beyond earnings on firm value. Studies include: Hughes (2000); Dhaliwal *et al*. (2011); El Ghoul *et al*. (2011); Bertoneche and Lugt (2013); Kiron *et al*. (2013); Goss and Roberts (2011); Hamann *et al*. (2013). | Scholarly research addresses the interaction between and integration of financial and non-financial dimensions of sustainability performance. Among these studies are Einhorn (2005); Ioannou and Serafeim, (2012); Fellow (2013); Healy and Palepu (2001); Botosan (1997); Healy *et al*. (1999). |

Columns three, four and five of Table 2 provide synopses of several studies that examine the link between financial ESP and non-financial ESG dimensions of sustainability performance and their integrated effects on financial and market performance as well as risk assessment, cost of capital, and firm value. This category of research consists of several studies such as Dhaliwal *et al*. (2011) and El Ghoul *et al*. (2011) which provide empirical evidence that suggests that ESG programs improve a firm's future financial performance. Several studies examine the benefits of sustainability and whether sustainability investments in environmental and social issues pay off in terms of customers' perceptions toward products and services (Bansal and McKnight, 2009; Carter and Easton, 2011; Fawcett and Waller, 2011; Luchs *et al*., 2010). Jain *et al*. (2016) report that ESP and ESG sustainability performance dimensions are linked and that short sellers avoid firms with high ESG scores and tend to target firms with low ESG scores. Huang and Watson (2015) review research on CSR/ESG published in the last decade in thirteen top accounting journals and conclude that it is difficult to measure financial impacts of CSR initiatives in terms of their associated costs and potential benefits. Taken together, these studies report a U-shaped relationship between financial and non-financial dimensions of sustainability performance where very small and very large firms are more likely to engage in CSR activities and performance.

The relationship between various financial ESP and non-financial ESG dimensions of sustainability performance and firms' risk (and thus their cost of capital including debt and equity capital) has been examined in numerous studies. Spicer (1978) argues that there is a moderate to strong relationship between a firm's common shares and its CSR performance with respect to environmental risk. Ng and Rezaee (2015) find that both financial economic and non-financial ESG sustainability performance are negatively associated with cost of equity capital, and the link between financial performance and cost of equity is stronger in the presence of ESG sustainability performance. Several other studies (e.g., Corbett and Klassen, 2006; Pagell *et al.*, 2006) document the relevance of green and social initiatives to supply chain management by investigating whether it pays to be green and socially responsible and how business organizations should deal with environmental and social issues.

The last column of Table 2 presents results of several studies pertaining to sustainability reporting and assurance and their role in communicating financial ESP and non-financial ESG sustainability information to stakeholders. The interaction between (and of) voluntary (nonfinancial) and mandatory (financial) dimensions of sustainability performance disclosures has been examined in scholarly research (Beyer *et al.*, 2010; Einhorn, 2005; and Verrecchia, 1983 and 2001) by performing an analysis. It finds that mandatory disclosures significantly affect voluntary disclosure strategies and specifically states that "the value of mandatory disclosure requirements cannot be properly assessed without an understanding of what, if any, voluntary disclosures might be made in addition to the mandatory disclosures." Several studies suggest that firms with good ESG information make the most exhaustive disclosures and thus voluntarily disclose such information to reduce information asymmetry and avoid adverse selection (e.g., Al-Tuwaijri *et al.*, 2004; Clarkson *et al.*, 2011; and Verrecchia, 2001). Other studies (e.g., Bebbington and Larrinaga, 2014; Contrafatto, 2014; Gray, 2010; and Hopwood, 2009) underscore the importance of proper accounting, reporting, and assurance of sustainability information. Selmier *et al*. (2015) propose a business model of language resource acquisition policy to communicate CSR performance to stakeholders.

Taken together, findings of prior research as summarized in Table 2 provide mixed evidence of the link between financial ESP and non-financial ESG sustainability performance dimensions and their integrated effects on financial and market performance and cost of capital and firm value.

While these streams of research have contributed to our understanding of factors affecting business sustainability, they are often conducted in an isolated fashion with the main focus on social, governance, and environmental sustainability and thus do not reflect the integrated impacts of drivers of financial and non-financial sustainability performance and their integration into corporate culture and management strategies, processes, and reporting. As corporate sustainability is gaining deserved attention from international businesses, policymakers, regulators, and investors, more research needs to be done in examining various aspects of corporate sustainability including theories, standards, performance, risks, and sustainability reporting and assurance as discussed in the next several sections.

This paper seeks to shed light on the tensions between financial and non-financial sustainability performance measures in creating stakeholder value by presenting an integrated theoretical framework that addresses both positive and negative sustainability externalities. Corporate sustainability demands integrated efforts by management and changes in corporate culture and managerial mindset from focusing on the short-termism of the tangible quick wins to the achievement of long-term and sustainable financial and non-financial performance. Given the ever-growing attention to corporate sustainability and mixed empirical results of the possible link between financial and non-financial components of sustainability performance, this paper develops a framework that presents an integrated and holistic framework for business sustainability performance and reporting. The proposed framework consists of sustainability theories, continuous performance, shared value, and sustainability reporting and assurance as presented in the following sections of III-VI.

## III. Sustainability Theories

Rezaee (2016) discusses several theories including agency/shareholder, stakeholder, signaling/disclosure, institutional, legitimacy, and stewardship relevant to corporate sustainability. These theories are summarized in this section and can collectively explain the interrelated dimensions of sustainability performance and their integrated link to corporate culture, business model, and managerial strategies, processes, and practices and their implications for international businesses. These theories provide a theoretical foundation to analyze the various financial ESP and non-financial ESG dimensions of sustainability performance and their integrated effects in creating shared value for all stakeholders.

### *A. Agency/ Shareholder Theory*

Agency/shareholder theory focuses on risk sharing and agency problems between shareholders and management by suggesting that the interests of principals (owners) and their agents (executives) are often not aligned (Fama and Jensen, 1983). In the context of agency theory, moral hazards occur in the presence of information asymmetry where the agent (management) acting on behalf of the principal (shareholders) knows more about its actions and/or intentions than the principal does due to a lack of proper monitoring of the agent. The implications of shareholder theory for sustainability performance are that management incentives and activities often focus on short-term earnings targets which are normally linked to executive compensation and detract from achieving sustainable and long-term performance for shareholders. Under this theory, non-financial ESG sustainability activities (particularly CSR expenditures) are typically viewed as the allocation of firm resources in pursuit of activities that are not in the best interest of shareholders,

even though they may create value for other stakeholders. Thus, firms should focus on creating shareholder value and leave the decisions about social responsibility to their shareholders. There is information asymmetry, as only senior management typically knows the true representation of financial reports. Thus, to mitigate the perceived information asymmetry, management may choose to voluntarily disclose non-financial ESG performance information.

### *B. Stakeholder Theory*

Stakeholders have a reciprocal relationship and interaction with a firm in the sense that they contribute to the firm's value creation, and the firm's performance affects their well-being. Freeman's (1984) stakeholder theory and Jensen's (2001) "enlightened value maximization" theory recognize maximization of sustainable performance and the long-term value of the firm as the criteria for balancing interests of all stakeholders. In the context of shareholder wealth maximization and stakeholder welfare maximization, non-financial ESG sustainability activities create both synergies and conflicts. Stakeholder theory suggests that sustainability activities and performance enhance the long-term value of the firm by fulfilling the firm's'social responsibilities (Campbell, 2007), meeting their environmental obligations (Clarkson *et al*., 2011), and improving their reputation (Weber, 2008). However, these sustainability activities may require considerable resource allocation that could conflict with shareholder wealth maximization objectives and force management to solely invest in sustainability initiatives that would result in long-term financial sustainability.

Stakeholder theory applies to all managerial processes in the sense that the synergy and integration among all elements of the business model and its processes are essential in achieving overall sustainable performance objectives (Donaldson and Preston, 1995; Freeman, 2010). From the stakeholder's perspective, an organization is viewed as part of the social system consisting of groups that work together to achieve the system goals. However, management may take actions to improve sustainability performance that benefit particular stakeholders (shareholders) who have the power to influence its compensation. Cormier *et al.* (2005) argues that management's consideration of stakeholders' interests is a key determinant of focus on social and environmental sustainability performance and disclosures. The application of stakeholder theory to management processes suggests that a company should be viewed as a nexus of all components of a firm's managerial processes, including inbound and outbound logistics, processes and operations, finished products and customer interface, distribution channels, and services, which are integrated to achieve sustainability performance in all five EGSEE dimensions.

### *C. Legitimacy Theory*

Legitimacy theory, which was built on a socio-political view, posits that firms should preserve their legitimacy by fulfilling their social and political contracts. Firms should communicate valuable and relevant financial ESP sustainability performance information and engage in non-financial ESG sustainability activities to obtain legitimacy and fulfill the 'social contract' (Guthrie and Parker, 1989; Tilling, 2004). Legitimacy theory suggests that non-financial ESG sustainability performance is desirable for all stakeholders, including customers, society, and the environment. The theory also proposes that non-compliance with social norms and environmental requirements threatens organizational legitimacy and ,financial sustainability, and

thus organizations use environmental and social disclosures to satisfy society's demands (Guthrie and Parker, 1989; Tilling, 2004).

Legitimacy theory is important in solidifying companies' reputations, and thus their products and services must be desirable, proper, and of a quality within social norms and values, and must benefit rather than harm the environment and society (Suchman, 1995). For example, tobacco companies may increase their shareholder wealth (promoted by shareholder theory) by selling their products at the risk of harming the health of customers. Sustainability is an integral component of management strategies, particularly when there is conflict between the corporate goals of maximizing both financial and social goals. The existence and persistence of such conflicts require corporations to establish managerial policies, programs, and practices to ensure their boards of directors and senior executives set an "appropriate tone at the top," take sustainability and the social interest seriously, and require their suppliers to adhere to product quality and social and environmental requirements.

### *D. Signaling Theory*

Signaling theory helps explain management incentives for achieving both financial ESP and non-financial ESG dimensions of sustainability performance and investors' reaction to the disclosure of sustainability performance information (Grinblatt and Hwang, 1989). Signaling theory suggests that firms disclose "good news" through the use of various mandatory financial reports on their ESP and voluntary reporting of non-financial ESG sustainability performance to differentiate themselves from less sustainable firms. The signaling theory suggests that firms should promote their good sustainability stories and communicate effectively with all stakeholders to build branding and develop a good reputation for themselves. However, the expected link between a firm's voluntary non-financial sustainability performance reporting and the use of these signals is ambiguous. Healy and Palepu (2001) suggest that firms' voluntary reporting may act as a complement to signal information about expected future financial performance. Alternatively, these signaling mechanisms could be substitutes, suggesting a negative relationship between the probability of voluntary disclosures and the use of these signals (Grinblatt and Hwang, 1989). Signaling theory encourages business organizations to communicate with all stakeholders (including supply chain partners) regarding the synergy, integration, and resource dependency of different components of supply chain management and send a uniform signal to achieve both financial ESP and non-financial ESG dimensions of sustainability performance (Connelly *et al*., 2011; Dainelli *et al.*, 2013).

### *E. Institutional Theory*

The seminal article published by Meyer and Rowan (1977) set the foundation for the application of institutional theory to personal politics (Edelman, 1992; Tolbert and Zucker, 1983), to domestic and international governmental policies (Strang, 1990), and to the development of organizational missions and forms (DiMaggio, 1991; Fligstein, 1985). Institutional theory focuses on the role of normative influences in decision-making processes that affect organizational structure and offers a structural framework that can be useful in addressing many issues, conditions, and challenges that lead the structure to institutionalization. It focuses on the social aspects of decision-making (such as the decision to invest in CSR expenditures), the conditions

under which the investment decisions on CSR or environmental initiatives are made, and their possible impacts on the environment and society.

Institutional theory views a firm as an institutional form of diverse individuals and groups with unified interests, transaction governance, values, rules, and practices that can become institutionalized. Jennings and Zandbergen (1995, p. 1015) state that "institutional theory helps to understand how consensus is built around the meaning of sustainability and how concepts or practices associated with sustainability are developed and diffused among organizations." Institutional theory primarily focuses on the rationalization, legitimacy, practicality, and aspects of social structure and related processes in establishing guidelines and best practices in compliance with applicable laws, rules, standards, and norms. A more pragmatic institutional theory promotes business sustainability by viewing a firm as an institution to serve human needs and protect all relevant interests (Roberts, 2004). A firm as an institution is sustainable as long as it creates value for all stakeholders including shareholders. Thus, the implication of institutional theory for promoting business sustainability is that social and environmental initiatives, corporate governance measures, and ethical practices will ultimately reach such a level of legitimization and best practices that failure to adopt them will be considered irresponsible and irrational, and thus these practices will become legal mandates.

### *F. Stewardship Theory*

Stewardship theory stems from sociology and psychology and views management as stewards of all corporate assets and capitals in protecting the interests of all stakeholders. Hernandez (2008, p. 122) states that stewardship theory promotes "the long-term best interests of a group ahead of personal goals that serve an individual's self-interests." Stewardship theory as defined by Hernandez (2012) is applicable to emerging corporate sustainability where management is responsible and should be held accountable for safeguarding both tangible and intangible corporate assets, as well as effectively and efficiently using all corporate financial, human, intellectual, societal, and environmental capitals in creating shared value for all stakeholders. Stewardship theory helps to explain ways in which business organizations should be held responsible as stewards for creating shared value by contributing to wealth creation for shareholders as well as contributing to the wellbeing of customers, employees, society, and the environment. Stewardship theory is applicable to corporate sustainability because it considers management strategic decisions and actions as stewardship behaviors that "serve a shared valued end, which provides social benefits to collective interests over the long term" (Hernandez 2012, p. 186).

In summary, stakeholder theory appears to be the prevailing theory of corporate sustainability as suggested by Freeman (1984). Mitchell *et al.* (1997) discuss a normative theory of stakeholder identification explaining why management may consider certain groups (e.g., owners, non-owners) as the firm's stakeholders and a descriptive theory of stakeholder salience describing the conditions under which management may recognize certain groups as stakeholders. One of the most prevailing and broad definitions of a stakeholder is provided by Freeman (1984, p. 46) as "any group or individual who can affect or is affected by the achievement of the organization's objectives." In the context of corporate sustainability, stakeholders can be classified as internal stakeholders who have a direct interest (stake) and bear risks associated with business activities and other external stakeholders as illustrated in Table 1. Stakeholders are those who have vested interests in a firm through their investments in the form of financial capital (shareholders),

human capital (employees), reputational capital (customers and suppliers), social capital (the society), environmental capital (environment), and regulatory capital (government). Stakeholders have reciprocal relationships and interactions with a firm in the sense that they contribute to the firm value creation (stake), and their well-being is also affected by the firm's activities (risk). Legitimacy and institutional theories are closely related to stakeholder theory in the sense that only those with legitimate claims and institutional identification can be considered stakeholders. Attributes of stewardship theory are aligned with themes of corporate sustainability. Specifically, several aspects of stewardship including long-term orientation and the protection of the interests of all stakeholders are the main drivers of corporate sustainability.

All the theories discussed above are relevant to corporate sustainability, and businesses should utilize one or several (as an integrated theory) that can be tailored to their mission, strategies, business model, and reporting processes.[6] This conclusion leads to the development of the following propositions pertaining to sustainability theory integration.

***Proposition 1a: A combination of the above theories is most relevant and applicable in providing a theoretical foundation for better understanding of the emerging corporate sustainability.***

***Proposition 1b: Stakeholder and stewardship theories share many core values with corporate sustainability by focusing on management stewardship strategies and practices that promote continuous performance improvement and create shared value for all stakeholders.***

***Proposition 1c: Management with a sustainability-oriented focus is more likely to integrate a combination of these theories with sustainability strategies that align with the company's core business of improving continuous performance and creating shared value.***

## IV. Shared Value Creation

Public companies are being criticized for primarily focusing on profit maximization, and thus shareholder value creation, with minimal attention to the impacts of their operations on society and the environment (Porter and Kramer, 2011). Management theories and practices are often driven by management's short-termism behavior and are typically intended to resolve or manage uncertainty and reduce information asymmetry in the pursuit of creating firm value (Rezaee, 2015). The two measures of firm value, namely the economic value and market value, may diverge (Committee for Economic Development, CED, 2007). This divergence can be caused by many factors, including the quality and quantity of earnings and other financial and non-financial information disseminated to the market. Investors may trade shares based on expectations about the company's future earnings growth and performance and to a great extent based on short-term considerations of quarterly earnings targets that may cause changes in stock prices independent of changes in the company's true condition and long-term performance. Management, assets managers, equity analysts, and even shareholders are motivated and thus their behaviors are biased toward short-term performance (CED, 2007; KPMG, 2013). This short-termism behavior is in contrast with the long-term view of business sustainability.

As corporate sustainability is gaining more attention and being integrated into the business culture and model, there has been a shift from the creation of shareholder value to the development of "sustainable shared value creation" to protect interests of all stakeholders (Porter and Kramer,

[6] The theories discussed in this section are not all-inclusive, and there are other theories (e.g., natural resource based) that may be relevant to some dimensions of sustainability performance.

2011). The concept of shared value is defined as "policies and practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates" (Porter and Kramer, 2011, p. 65). Under the shared value creation concept, management focuses on the continuous performance improvement of business operations in generating long-term value while maximizing the positive impacts of operations on society and the environment by measuring sustainable performance in terms of both ESP and ESG sustainability performance. Thus, corporate objectives have advanced from profit maximization to increasing shareholder wealth and now to creating shared value for all stakeholders. This leads to the following proposition:

***Proposition 2a: Shared value creation recognizes the importance of the main business objective of creating shareholder value through ESP while protecting the interests of other stakeholders through both ESP and ESG sustainability performance in maximizing (minimizing) positive (negative) impacts on society and the environment (the enforcement of human rights and climate change).***

The theoretical intuition for the potential link between the short-term financial performance of shareholder value creation and the long-term sustainable performance of creating shared value for all stakeholders follows that of Jensen's theory of "enlightened value maximization" (Jensen, 2001). The enlightened value maximization suggests that while the main objective of any business organizations is to maximize firm value, there should be proper balance between economic sustainability performance (ESP) and other ESG sustainability performance dimensions. The enlightened value maximization concept of sustainability performance is supported by recent anecdotal evidence, which suggests that firms that "see sustainability as both a necessity and opportunity, and change their business models in response, are finding success" (Kiron *et al*. 2013).

The emergence of corporate sustainability creates both opportunities for corporate involvement in value creation beyond economic imperatives to improve the ESG profile of companies (Aguilera *et al*., 2007; McGrath *et al*., 2004) and challenges in allocating scarce resources subject to a variety of strategic, operational, financial, compliance, and reputational risks (Rezaee, 2015). Management may attempt to achieve short-term targets to create shareholder value (CED 2007; KPMG, 2013) whereas corporate sustainability encourages management to focus on achieving long-term financial and non-financial performance ESG sustainability (Brockett and Rezaee, 2012; Rezaee 2015; Ng and Rezaee, 2015). The keen focus on optimizing short-term financial performance can cause management to overlook the importance of long-term and enduring ESP and ESG sustainability performance in creating shared value. It is possible that management may be more inclined to focus on ESP or ESG or act in a similar direction or opposite direction regarding ESP and ESG. These possibilities introduce tension in the following propositions.

***Proposition 2b: Firms that pay attention to ESG sustainability performance have more incentives to focus on sustainable and long-term economic sustainability performance (ESP).***

***Proposition 2c: Management, with the focus on short-term considerations, is more likely to overlook the adverse impact on long-term and sustainable shared value creation and even cause reduction in the expected value of future returns and thus the current share prices.***

***Proposition 2d: Management fixation on short-term considerations can contribute to opportunistic earnings management rather than sustainable performance management.***

***Proposition 2e: Whether management focuses on ESP to create shareholder value or ESG to protect interests of other stakeholders or both is an open question, and the empirical evidence is mixed.***

## V. Sustainability Continuous Performance Improvements

The overall objective for business organizations is to create shared value for all stakeholders by generating financial ESP subject to the achievement of non-financial ESG sustainability performance as a set of constraints imposed on the objective. Sustainability performance measures should be derived from internal factors of strategy, risk profile, strengths and weaknesses, and corporate culture as well as external factors of reputation, technology, competition, CSR, globalization, and utilization of natural resources. Integration of the ESP and ESG dimensions of sustainability performance into the corporate infrastructure, business model, and management processes enables companies to conserve scarce resources, optimize production processes, identify product innovations, achieve cost efficiency and effectiveness, increase productivity, and promote corporate reputation. Agrawal *et al*. (2006) classify business activities as value-adding or non-value-adding, and essential or non-essential. Achievement of financial ESP and non-financial ESG dimensions of sustainability performance and the aspects of continuous improvements enables organizations to move toward addressing the overriding objective of sustainability in creating shared value. This section then fleshes out the various corporate activities and sustainability performance dimensions, followed by a set of propositions on implications for organizational structure, accountability, innovation, decision-making, risk, and performance.[7]

### *A. Economic Sustainability Performance (ESP)*

Economic sustainability performance reflects the long-term profitability and financial sustainability of the company as measured in terms of long-term operational effectiveness, efficiency, productivity, earnings, return on investment, and market value. Economic sustainability performance is presented in a set of financial statements that enable investors to better assess the risk and return associated with their investments. Economic sustainability performance is viewed as both a value-adding and essential activity, which measures the long-term profitability and financial sustainability of the company as demanded by shareholders under the agency/shareholder theory. Economic sustainability can be achieved by continuously improving capital productivity by optimizing supply chains, cost reengineering focused on reducing operating, production, and compliance costs, improving employee productivity and efficiency, and focusing on activities that create long-term, enduring, and sustainable financial performance. A focus on economic sustainability can also create opportunities for business innovation and growth by promoting sustainable products and services, new customer relationships, and new markets through environmentally friendly and socially acceptable products and services.

Economic sustainability performance is measured in terms of long-term accounting-based measures (return on equity, sales), market-based measures (stock returns, market-book value) and

[7] The five economic, governance, social, ethical and environmental (EGSEE) dimensions of sustainability performance are classified into the broad category of financial economic sustainability performance (ESP) and non-financial environmental, social, and governance (ESG) sustainability performance; ethical performance is integrated into both ESP and ESG in compliance with G4 of the GRI (Global Reporting Initiative, 2013).

long-term investments (R&D and advertising) and disclosed through a set of financial statements disseminated to shareholders and used in assessing the risk and return associated with their investments. A survey of 1,400 directors and executives reveals that boards and executives are "spending more time talking about leading indicators that reflect the long-term health of the company…and sharpening their focus on the company's drivers of long-term value creation" (KPMG, 2013). Academic research suggests that ESP is essential in creating shareholder value by examining the value-relevance of financial information and its link to stock prices and cost of capital. For example, Barth *et al*. (2008); Brown *et al*. (2006); Jain *et al*. (2016); and Ng and Rezaee (2015) find that firms with better ESP exhibit better financial and market performance and lower cost of equity. The following propositions are relevant to ESP as supported by prior research:

***Proposition 3a: The greater the focus on economic sustainability performance, the more likely management takes long-term strategic initiatives that create shared value.***

***Proposition 3b: Management with a sustainability-oriented focus would pay more attention to long-term economic sustainability performance than short-term financial performance.***

***Proposition 3c: Management with a sustainability-oriented focus is more likely to integrate sustainability strategies that align with the company's core business of improving and maximizing economic sustainability performance.***

***Proposition 3d: Management with an economic sustainability-oriented focus is more likely to generate sustainable revenue, create business growth opportunities, and stimulate innovation in products and services.***

### *B. Environmental, Social, and Governance (ESG) Sustainability Performance*

The non-financial dimensions of sustainability performance include environmental, social, and governance (ESG) with ethics typically integrated into other three ESG components. Overall, ESG sustainability performance may be considered as essential activities that may or may not create shareholder value. Each of these ESG components, their business orientation, and related theories are explained in the following paragraphs. Eccles *et al*. (2014) find that firms that focus on their ESP sustainability performance and the disclosure of such performance significantly and consistently outperform those firms with no commitment to ESG. Ng and Rezaee (2015) report that ESG sustainability moderates the negative association between financial ESP sustainability and cost of equity capital and thus improves firm value.

Environmental performance reflects how effectively a company addresses its environmental challenges in leaving a better environment for future generations. Environmental disasters such as the Union Carbide, Exxon, and BP Deepwater Horizon incidents have created a bad reputation for businesses in some industries (the chemical and oil sectors) and required them to pay more attention to their environmental initiatives. Environmental performance can affect economic performance by reducing the likelihood of environmental law violations that may have detrimental financial consequences. Environmental performance is measured in terms of reduction in carbon footprint, creation of a better work environment, and improvement in the air and water quality of the property and the surrounding community.

Governance performance reflects the effectiveness of corporate governance measures in managing the company to achieve its objectives of creating shareholder value and protecting the interests of other stakeholders. Corporate governance mechanisms are normally established by policymakers, regulators, and corporations to promote economic stability, public trust, and

investor confidence in public financial information and capital markets. Regulatory reforms such as the Sarbanes-Oxley Act of 2002 (SOX, 2002) and the Dodd-Frank Act of 2010 (DOF 2010) are intended to strengthen corporate governance measures by defining roles and responsibilities of corporate gatekeepers, including the board of directors, management, and auditors.

Social performance reflects how and to what extent a company fulfills its social responsibility by making its social mission a reality and aligning it with the interests of society. Social performance ranges from focusing on delivering high quality products and services that are not detrimental to society to improving employee health and well-being and becoming a positive contributor to the sustainability of the planet. Social performance measures corporate activities that contribute to society beyond compliance with applicable laws, regulations, standards, and common practices. Social performance can increase reputation and improve corporate image and may result in sustainable financial performance in the long term.

The following propositions are made regarding ESG sustainability performance dimensions and their integration with ESP sustainability performance:

***Proposition 4a: Management with a sustainability-oriented focus is more likely to strike a proper balance between ESP and ESG sustainability performance.***

***Proposition 4b: Investors' demands and regulatory requirements for disclosing ESG sustainability information encourage management to focus on ESG sustainability performance.***

***Proposition 4c: The main drivers of long-term and non-financial ESG sustainability performance are innovation, attraction of talent, customer satisfaction, corporate reputation, loyalty, and responsibility to society and the environment.***

The literature, as reviewed in Section II, presents two views of the link between financial ESP and non-financial ESG sustainability performance. One view is that financial and non-financial sustainability performance dimensions are complementary because a firm that is governed effectively adheres to ethical principles and commits to CSR and environmental obligations is also sustainable in generating long-term financial performance. Another view is that corporations must do well financially in the long term to be able to do "good" in terms of CSR and environmental activities. Thus, financial and nonfinancial sustainability performance are interrelated and should be integrated to achieve cost-effectiveness (cleaner and cheaper energy; organic, safe, and high-quality products; recycling, waste reduction), to generate revenue (customer sales and premiums for socially and environmentally friendly products and services), and to manage sustainability risk. ESP and ESG sustainability performance dimensions supplement each other and are not mutually exclusive. Companies that are governed effectively are socially and environmentally responsible, and conduct themselves ethically; they are expected to produce sustainable performance, create shareholder value, and gain investor confidence and public trust. Thus, financial ESP and non-financial ESG sustainability performance dimensions are complementary and completing, rather than conflicting and competing. Thus, the following propositions can be advanced regarding the continuous improvements in ESP and ESG sustainability performance:

***Proposition 4d: Management with a sustainability-oriented focus is more likely to consider ESP and ESG as being completing/complementing rather than conflicting/competing with each other.***

***Proposition 4e: Corporate culture along with management attitude toward sustainability can significantly influence the adoption and integration of sustainability into the business model.***

## VI. Sustainability Performance Reporting and Assurance

Public companies have traditionally disclosed financial information regarding their ESP sustainability performance to regulators and shareholders and may choose to voluntarily disclose non-financial information pertaining to their ESG sustainability performance to other stakeholders. Mandatory financial reporting includes financial statements and audit reports on both financial statements and the related internal control over financial reporting (ICFR) in compliance with either generally accepted accounting principles (GAAP) in the United States or the International Financial Reporting Standards (IFRS). These mandatory financial statements should be audited in compliance with the International Auditing and Assurance Standards (IAAS) or auditing standards in the United States in order to lend more credibility to these financial statements and make them relevant, useful, reliable, and transparent to investors.

Voluntary non-financial ESG sustainability performance reports are currently considered as disclosure of any financial and non-financial information outside of financial statements that are required by regulators and standard-setters. Recently, several countries, including Australia, Austria, Canada, Denmark, France, Germany, Malaysia, the Netherlands, Sweden, Hong Kong, and the United Kingdom, have adopted mandatory reporting on ESG sustainability information. It is expected that regulators in other countries will follow suit, moving toward mandatory sustainability reporting on both financial ESP and non-financial ESG sustainability performance information. Several global organizations including the Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC), and the Sustainability Accounting Standard Board (SASB) have developed and will continue to develop guidelines for integrated sustainability reporting and assurance. The Global Reporting Initiative (GRI) (in its G4 sustainability guidelines) promotes integrated reporting on both financial ESP and non-financial ESG dimensions of sustainability performance (GRI, 2013). Two commonly used assurance standards released by the IAASB (International Standard on Assurance Engagements), namely "Other Than Audits or Reviews of Historical Financial Information" (ISAE 3000), and "Assurance Engagements on Greenhouse Gas Statements" (ISAE ED-3410), provide guidelines for auditors in providing assurance on non-financial ESG information.

More than 8,000 global public companies issued stand-alone sustainability reports in 2015, compared with fewer than 500 companies in 2005 (Rezaee, 2015). As investors and regulators continue to demand sustainability information and sustainability reporting becomes more standardized, management should integrate sustainability reporting into corporate reporting. Furthermore, as more companies worldwide issue sustainability reports on their financial ESP and non-financial ESG sustainability performance, these reports should be audited and/or reviewed by assurance service providers. Reliability, objectivity, and credibility of the issued sustainability reports can be substantially improved by providing assurance on these reports. This leads to the following propositions:

***Proposition 5a: Management with a more sustainability-related focus is more likely to disclose sustainability performance information to signal its superior sustainability performance and differentiate its company from less sustainable companies.***

***Proposition 5b: Companies with a greater desire to build their corporate reputation and need to improve stakeholder confidence in their sustainability initiatives and performance are more likely to disclose their financial ESP and non-financial ESG sustainability performance.***

***Proposition 5c: Management who discloses sustainability performance information is more likely to provide sustainability assurance to lend more credibility to disclosed sustainability information.***

***Proposition 5d: Companies that issue stand-alone sustainability reports are more likely to have their sustainability reports assured.***

***Proposition 5e: Companies that issue stand-alone sustainability reports are more likely to choose sustainability assurance from the auditing profession.***

## VII. Relevance of the Proposed Sustainability Framework for Business Organizations and Future Research

The sustainability framework presented in this paper focuses on the four sustainability theories, shared value concept, continuous sustainability performance dimensions, and reporting and assurance components and their integrated effects and implications for business organizations and academic research. The primary goal of business sustainability has advanced from profit maximization to enhancing shareholder wealth and now to sustainability in creating shared value for all stakeholders. Disclosure of financial ESP and non-financial ESG dimensions of sustainability performance signals corporations' commitments to all stakeholders. In creating shared value, corporations should consider the cost-benefit analysis of their move toward sustainability. Business organizations that choose to be global leaders in sustainability should set a tone at the top, with their boards of directors and executives integrating sustainability into their corporate culture, business models, and managerial strategies, decisions, and actions. Companies that are inspired to be sustainable should also communicate their sustainability commitments and the related stories to all stakeholders through an integrated and holistic sustainability reporting and assurance system.

Business schools worldwide play an important and perennial role in preparing the next generation of business leaders, who must understand the importance of business sustainability in our society and the new accountability and integrated sustainability reporting and assurance expectations. Despite the importance of business sustainability to corporations and investors, there is limited research on the status of business sustainability education. Rezaee and Homayoun (2014) examine the coverage of sustainability education and find that as demand for and interest in sustainability education has increased in recent years, more business schools are planning to provide such education. The coverage of sustainability education topics in a separate course or their integration into existing business courses requires the classification of related topics into teaching modules covering both the financial ESP and non-financial ESG dimensions of sustainability performance and related theories, standards, and risks discussed in this paper. The use of the module approach to sustainability education enables instructors to customize their syllabi by promoting critical thinking and the flexibility to cover all or selected modules in their course.

A significant number of prior studies have contributed to our understanding of the drivers of the non-financial ESG dimension of sustainability performance and its effect on financial and market performance and firm value. However, these studies are often conducted in an isolated fashion and thus do not reflect the integrated impacts of financial and non-financial sustainability performance measures. The link between financial ESP and non-financial ESG dimensions of sustainability performance, the possible tensions among these sustainability dimensions, and their integrated effect on market performance, cost of equity, and firm value is yet to be sufficiently

addressed in scholarly research. Thus, there are numerous research opportunities in corporate sustainability, including board diversity, executive compensation, sustainability executive position, corporate governance effectiveness, environmental initiatives , sustainable supply chain management, CSR commitments, sustainability tone at the top including policies and practices, integrated and tagged reporting on sustainability performance, continuous assurance on sustainability reporting, and emerging guidelines and standards on sustainability reporting and assurance.

## VIII. Conclusion

Corporate sustainability has advanced from greenwashing and branding to a business imperative as regulators require, investors demand, and corporations continue to disclose sustainability information. More than 8,000 global public companies are now disclosing their financial ESP and non-financial ESG sustainability performance information in an integrated sustainability report or combined with other corporate reports. This paper presents a framework for corporate sustainability that enables business organizations to focus on their sustainable and long-term performance and its continuous improvements, and communicate sustainability performance information to all stakeholders. In this context, sustainability focuses on business activities that create shared value by generating long-term financial ESP as well as voluntary activities that result in the achievement of ESG sustainability performance that concerns all stakeholders.

The proposed integrated sustainability framework consists of four strategies of sustainability theory integration: shared value creation, continuous performance improvements, and sustainability reporting and assurance. This framework presents the continuous improvement of sustainability performance in developing a business model based on the stakeholder/stewardship theory, which generates sustainable shared value creation, brand building, employee engagement, customer satisfaction, and environmental and social activities. This integrated sustainability framework acknowledges that sustainability decision-making is also complex and fraught with uncertainty, just like decision-making for shareholder value, because sustainability entails making investments in light of an uncertain future. The framework developed in this paper integrates ESP and ESG sustainability performance dimensions into managerial decision-making under conditions of uncertainty related to the potential complementary/completing and or competing/conflicting tensions among sustainability performance dimensions. It discusses sustainability performance dimensions in terms of their contributions to shared value creation that benefits all stakeholders.

## References

**Agle, Bradley R., Thomas Donaldson, R. Edward Freeman, Michael C. Jensen, Ronald K. Mitchell, and Donna J. Wood.** 2008. "Dialogue: Toward Superior Stakeholder Theory." *Business Ethics Quarterly,* 18(2): 153-90.

**Agrawal, Surendrap P., Zabihollah Rezaee, and Hong S. Pak.** 2006. "Continuous Improvement: An Activity-Based Model." *Management Accounting Quarterly,* Spring: 14-22.

**Aguilera, Ruth V., Deborah E. Rupp, Cynthia A. Williams, and Jyoti Ganapathi.** 2007. "Putting the S Back in Corporate Social Responsibility: A Multilevel Theory of Social Change in Organizations." *Academy of Management Review,* 32(3): 836-63.

**Al-Tuwaijri, Sulaiman A., Theodore E. Christensen, and K. Hughes II.** 2004. "The Relations Among Environmental Disclosure, Environmental Performance, and Economic Performance: A Simultaneous Equations Approach." *Accounting, Organizations and Society*, 29(5-6): 447-71.

**Bansal, Pratima and Trevor Hunter.** 2003. "Strategic Explanations for the Early Adoption of ISO 14001." *Journal of Business Ethics*, 46(3): 289-99.

**Bansal, Pratima and Brent McKnight.** 2009. "Looking Forward, Pushing Back and Peering Sideways: Analyzing the Sustainability of Industrial Symbiosis." *Journal of Supply Chain Management*, 45(4): 26-37.

**Barnett, Michael L.** 2012. "Why Stakeholders Ignore Firm Misconduct: A Cognitive View." *Journal of Management.* 0149206311433854.

**Barth, Mary E., Wayne R. Landsman, and Mark H. Lang.** 2008. "International Accounting Standards and Accounting Quality." *Journal of Accounting Research,* 46(3): 467-98.

**Bebbington, Jan, and Carlos Larrinaga.** 2014. "Accounting and Sustainable Development: An Exploration." *Accounting, Organizations and Society*, 39(6): 395-413.

**Bertoneche, Marc, and Cornis van der Lugt.** 2013. "Director Notes, the Sustainability Business Case: A Model for Incorporating Financial Value Drivers." Conference Board.

**Beyer, Anne, Daniel A. Cohen, Thomas Z. Lys, and Beverly R. Walther.** 2010. "The Financial Reporting Environment: Review of the Recent Literature." *Journal of Accounting and Economics*, 50(2-3): 296-343.

**Botosan, Christine A.** 1997. "Disclosure Level and the Cost of Equity Capital." *The Accounting Review* 72(3): 323-49.

**Bouslah, Kais, Lawrence Kryzanowski, and Bouchra M'Zali.** 2013. "The Impact of the Dimensions of Social Performance on Firm Risk." *Journal of Banking & Finance*, 37(4): 1258-73.

**Brockett, Ann, and Zabihollah Rezaee.** 2012. *Corporate Sustainability: Integrating Performance and Reporting.* Hoboken, NJ: John Wiley and Sons.

**Brown Jr., William D., Haihong He, and Karen Teitel.** 2006. "Conditional Conservatism and the Value Relevance of Accounting Earnings: An International Study." *European Accounting Review*, 15(4): 605-26.

**Campbell, John L.** 2007. "Why Would Corporations Behave in Socially Responsible Ways? An Institutional Theory of Corporate Social Responsibility." *Academy of Management Review,* 32(3): 946-67.

**Carter, Craig R., and P. Liane Easton.** 2011. "Sustainable Supply Chain Management: Evolution and Future Directions." *International Journal of Physical Distribution & Logistics Management,* 41(1): 46-62.

**CFA Institute.** 2015. "Environmental, Social and Governance (ESG) Survey." http://irrcinstitute.org/pdf/FINAL-CFA-ESG-Study-August-2015.pdf (accessed June 3).

**Cheng, Beiting, Ioannis Ioannou, and George Serafeim.** 2014. "Corporate Social Responsibility and Access to Finance." *Strategic Management Journal,* 35(1): 1-23.

**Clarkson, Peter M., Yue Li, Gordon D. Richardson, and Florin P. Vasari.** 2011. "Does it Really Pay to Be Green? Determinants and Consequences of Proactive Environmental Strategies." *Journal of Accounting and Public Policy*, 30(2): 122-44.

**Committee for Economic Development (CED).** 2007. "Built to Last: Focusing Corporations on Long-Term Performance." www.ced.org/docs/report/report_corpgov2007.pdf.

**Connelly, Brian L., S. Trevis Certo, R. Duane Ireland, and Christopher R. Reutzel.** 2011. "Signaling Theory: A Review and Assessment." *Journal of Management*, 37(1): 39-67.

**Contrafatto, Massimo** 2014. "The Institutionalization of Social and Environmental Reporting: An Italian Narrative." *Accounting, Organizations and Society*, 39(6): 414-32.

**Corbett, Charles J., and Robert D. Klassen.** 2006. "Extending the Horizons: Environmental Excellence as Key to Improving Operations." *Manufacturing & Service Operations Management*, 8(1): 5-22.

**Cormier, Denis, Michel Magnan, and Barbara Van Velthoven.** 2005. "Environmental Disclosure Quality in Large German Companies: Economic Incentives, Public Pressure or Institutional Conditions?" *European Accounting Review*. 14(1): 3-39.

**Dainelli, Francesco, Laura Bini, and Francesco Giunta.** 2013. "Signaling Strategies in Annual Reports: Evidence from the Disclosure of Performance Indicators." *Advances in Accounting, Incorporating Advances in International Accounting*, 29(2): 267-77.

**Dhaliwal, Dan S., Oliver Zhen Li, Albert Tsang, and Yong George Yang.** 2011. "Voluntary Nonfinancial Disclosure and Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting." *The Accounting Review*, 86(1): 59-100.

**DiMaggio, Paul J.** 1991. "Constructing an Organizational Field as a Professional Project: U.S. Art Museums 1920-1940." In *The New Institutionalism in Organizational Analysis*, ed. Walter W. Powell and Paul J. DiMaggio, 267-92. Chicago: University of Chicago Press.

**Donaldson, Thomas, and Lee E. Preston.** 1995. "The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications." *The Academy of Management Review*, 20(1): 65-91.

**Eccles, Robert G., Ioannis Ioannou, and George Serafeim.** 2014. "The Impact of Corporate Sustainability on Organizational Processes and Performance." *Management Science*, 60(11): 2835-57.

**Edelman, Lauren B.** 1992. "Legal Ambiguity and Symbolic Structures: Organizational Mediation of Civil Rights." *American Journal of Sociology*, 97(6): 1531-76.

**Einhorn, Eti.** 2005. "The Nature of the Interaction Between Mandatory and Voluntary Disclosures." *Journal of Accounting Research*, 43(4): 593-621.

**El Ghoul, Sadok, Omrane Guedhami, Chuck C.Y. Kwok, and Dev R. Mishra.** 2011. "Does Corporate Social Responsibility Affect the Cost of Capital?" *Journal of Banking and Finance*, 35(9): 2388-406.

**European Commission.** 2014. "Disclosure of Non-Financial Information: Europe Information: Europe Council, the European Economic and Social, Environmental Issues." ***http://ec.europa.eu/internal_market/accounting/non-financial_reporting/index_en.htm.***

**Fama, Eugene F., and Michael C. Jensen.** 1983. "Separation of Ownership and Control." *The Journal of Law and Economics*, Corporations and Private Property: A Conference Sponsored by the Hoover Institution), 26(2): 301-25.

**Fawcett, Stanley E., Matthew A. Waller, and Donald J. Bowersox.** 2011. "Cinderella in the C-Suite: Conducting Influential Research to Advance the Logistics and Supply Chain Disciplines." *Journal of Business Logistics*, 32(2): 115-21.

**Fellow, Avery.** 2013. "Investors Propose Requiring Sustainability Data Disclosure." Bloomberg. http://www.bloomberg.com/news/2013-04-09/investors-propose-requiring-sustainability-data-disclosure.html (accessed April 9).

**Fligstein, Neil.** 1985. "The Spread of the Multidivisional Form Among Large Firms, 1919-1979." *American Sociological Review,* 50(3): 377-91.

**Foerstl, Kai, Arash Azadegan, Thomas Leppelt, and Evi Hartmann.** 2015. "Drivers of Supplier Sustainability: Moving Beyond Compliance to Commitment." *Journal of Supply Chain Management.* January. 51(1): 67-92.

**Freeman, R. Edward.** 1984. *Strategic Management: A Stakeholder Perspective*. Boston: Pitman Publishing.

**Freeman, R. Edward, Andrew C. Wicks, and Bidhan Parmar.** 2004. "Stakeholder Theory and 'The Corporate Objective Revisited'." *Organization Science,* 15(3): 364-69.

**Freeman, R. Edward.** 2010. *Stakeholder Theory. The State of the Art.* Cambridge: Cambridge University Press.

**Friedman, Milton.** 1970**.** "The Social Responsibility of Business is to Increase Its Profits." *The New York Times Magazine*, September 13. http://www.colorado.edu/studentgroups/libertarians/issues/friedman-soc-resp-business.html.

**Garvare, Rickard, and Peter Johansson.** 2010. "Management for Sustainability—a Stakeholder Theory." *Total Quality Management & Business Excellence*, 21(7): 737-44.

**Gilbert, Dirk Ulrich, Andreas Rasche, and Sandra Waddock.** 2011. "Accountability in a Global Economy: The Emergence of International Accountability Standards." *Business Ethics Quarterly*, 21(1): 23-44.

**Global Reporting Initiative.** 2013. "G4 Sustainability Reporting Guidelines." https://www.globalreporting.org/resourcelibrary/GRIG4-Part1-Reporting-Principles-and-Standard-Disclosures.pdf.

**Goss, Allen, and Gordon S. Roberts.** 2011. "The Impact of Corporate Social Responsibility on the Cost of Bank Loans." *Journal of Banking & Finance,* 35(7): 1794-810.

**Gray, Robert H.** 2010. "Is Accounting for Sustainability Actually Accounting for Sustainability…. And How Would We Know? An Exploration of Narratives of Organizations and the Planet." *Accounting, Organizations and Society*, 35(1): 47-62.

**Grinblatt, Mark, and Chuan Yang Hwang.** 1989. "Signaling and the Pricing of New Issues." *Journal of Finance*, 44(2): 393-420.

**Guthrie, James, and Lee D. Parker.** 1989. "Corporate Social Reporting: A Rebuttal of Legitimacy Theory." *Accounting and Business Research*, 19(76): 343-52.

**Hamann, P. Maik, Frank Schiemann, Lucia Bellora, and Thomas W. Guenther.** 2013. "Exploring the Dimensions of Organizational Performance: A Construct Validity Study." *Organizational Research Methods,* 16(1): 67-87.

**Healy, Paul M., Amy P. Hutton, and Krishna G. Palepu.** 1999. "Stock Performance and Intermediation Changes Surrounding Sustained Increases in Disclosure." *Contemporary Accounting Research*, 16(3): 485-520.

**Healy, Paul M., and Krishna G. Palepu.** 2001. "Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review of the Empirical Disclosure Literature." *Journal of Accounting and Economics*, 31(1-3): 405-40.

**Hernandez, Morela.** 2008. "Promoting Stewardship Behavior in Organizations: A Leadership Model." *Journal of Business Ethics,* 80(1): 121-28.

**Hernandez, Morela.** 2012. "Toward an Understanding of the Psychology of Stewardship." *Academy of Management Review*. 37(2): 172-93.

**Hong Kong Stock Exchange (HKEx).** 2015. "Appendix 27 Environmental, Social, and Governance Reporting Guide Introduction," 1-13.

**Hopwood, Anthony G.** 2009. "Accounting and the Environment." *Accounting, Organizations and Society*, 34(3-4): 433-9.

**Huang, Xiaobei Beryl, and Luke Watson.** 2015. "Corporate Social Responsibility Research in Accounting." *Journal of Accounting Literature*, 34: 1-16.

**Hughes, K.E.** 2000. "The Value Relevance of Nonfinancial Measures of Air Pollution in the Electric Utility Industry." *The Accounting Review*, 75(2): 209-28.

**International Federation of Accountants.** 2015. "Accounting for Sustainability: From Sustainability to Business Resilience." July.

**Ioannou, Ioannis, and George Serafeim.** 2012. "What Drives Corporate Social Performance? The Role of Nation-Level Institutions." *Journal of International Business Studies*, 43(9): 834-64.

**Jain, Archana, Pankaj K. Jain, and Zabihollah Rezaee.** 2016. "Value-Relevance of Corporate Social Performance: Evidence from Short Selling." *Journal of Management Accounting Research*, 28(2): 29-52.

**Jennings, P. Deveraux, and Paul A. Zandbergen.** 1995. "Ecologically Sustainable Organizations: An Institutional Approach." *The Academy of Management Review*, 20(4): 1015-52.

**Jensen, Michael.** 2001. "Value Maximization, Stakeholder Theory, and the Corporate Objective Function." *European Financial Management*, 7(3): 297–317.

**Khan, Mozaffar, George Serafeim, and Aaron Yoon.** 2016. "Corporate Sustainability: First Evidence on Materiality." *The Accounting Review*. 91(6): 1697-1724.

**Kiron, David, Nina Kruschwitz, Knut Haanaes, Martin Reeves, and Eugene Goh.** 2013. *The Innovation Bottom Line: The Benefit of Sustainability-Driven Innovation*. MIT Sloan Management Review and the Boston Consulting Group. Research Paper. https://www.bcg.com/documents/file126806.pdf.

**Kiron, David, Nina Kruschwitz, Knut Haanaes, Martin Reeves, Sonja-Katrin Fuisz-Kehrbach, and Gerg Kell.** 2015. "Joining Forces: Collaboration and Leadership for Sustainability." *MIT Sloan Management Review*, the Boston Consulting Group, and the United Nations Global Compact. http://marketing.mitsmr.com/PDF/56380-MITSMR-BGC-UNGC-Sustainability2015.pdf?cid=1 (accessed January 12).

**KPMG.** 2013. "Beyond Quarterly Earnings: Is the Company on Track for Long-Term Success?" Spring 2013 Audit Committee Roundtable Report. https://boardleadership.kpmg.us/content/dam/blc/pdfs/2013/aci-spr-2013-roundtable-report-beyond-quarterly-earnings.pdf.

**KPMG**. 2015. "Currents of Change: The KPMG Survey of Corporate responsibility Reporting 2015." https://assets.kpmg.com/content/dam/kpmg/pdf/2016/02/kpmg-international-survey-of-corporate-responsibility-reporting-2015.pdf.

**Lindblom, C. K.** 1994. "The Implications of Organizational Legitimacy for Corporate Social Performance and Disclosure." Paper presented at the Critical Perspectives on Accounting Conference, New York.

**Luchs, Michael G., Rebecca Walker Naylor, Julie R. Irwin, and Rajagopal Raghunathan.** 2010. "The Sustainability Liability: Potential Negative Effects of Ethicality on Product Preference." *Journal of Marketing*, 74(5): 18-31.

**McGrath, Rita Gunther, Walter J. Ferrier, and Aubrey L. Mendelow.** 2004. "Response: Real Options as Engines of Choice and Heterogeneity." *The Academy of Management Review*, 29(1): 86-101.

**Meyer, John W., and Brian Rowan.** 1977. "Institutionalized Organizations: Formal Structure as Myth and Ceremony." *American Journal of Sociology*, 83(2): 340-63.

**Mitchell, Ronald K., Bradley R. Agle, and Donna J. Wood.** 1997. "Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts." *The Academy of Management Review*, 22(4): 853-86.

**Nidumolu, Ram, P. J. Simmons, and Terry F. Yosie.** 2015. "Sustainability and the CFO Challenges, Opportunities and Next Practices." Corporate EcoForum and World Environment Center, April.

**Ng, Anthony C., and Zabihollah Rezaee.** 2015. "Business Sustainability Performance and Cost of Equity Capital." *Journal of Corporate Finance*, 34: 128-49.

**Pagell, Mark, Zhaohui Wu, and Nagesh N. Murthy.** 2007. "The Supply Chain Implications of Recycling." *Business Horizons*, 50(2): 133-43.

**Patten, Dennis M.** 1992. "Intra-Industry Environmental Disclosures in Response to the Alaskan Oil Spill: A Note on Legitimacy Theory." *Accounting, Organizations and Society*, 17(5): 471-75.

**Porter, Michael E., and Mark R. Kramer.** 2011. "Creating Shared Value," *Harvard Business Review*, January-February: 62-77.

**PricewaterhouseCoopers.** 2015. "In the Loop: Sustainability Disclosures - Is Your Company Meeting Investor Expectations?" http://www.pwc.com/us/en/cfodirect/publications/in-the-loop/sustainability-disclosure-guidance-sasb.jhtml?display=/us/en/cfodirect/issues/governance (accessed July 2015).

**Potoski, Matthew, and Aseem Prakash.** 2005. "Green Clubs and Voluntary Governance: ISO 14001 and Firms' Regulatory Compliance." *American Journal of Political Science*, 49(2): 235-48.

**Rao, Purba, and Diane Holt.** 2005. "Do Green Supply Chains Lead to Competitiveness and Economic Performance?" *International Journal of Operations and Production Management*, 25(9): 898-916.

**Rehbein, Kathleen.** 2014. "Research Briefs: What Drives Executives to Make Socially Responsible Investments?" *Academy of Management Perspectives*, 28(3). http://dx.doi.org/10.5465/amp.2014.0132.

**Rezaee, Zabihollah, and S. Homayoun.** 2014. "Integration of Corporate Sustainability Education into the Business Curriculum: A Survey of Academics." *Journal of the Academy of Business Education*, Spring: 66-83.

**Rezaee, Zabihollah.** 2015. *Business Sustainability: Performance, Compliance, Accountability and Integrated Reporting*. Sheffield, UK: Greenleaf Publishing Limited.

**Rezaee, Zabihollah.** 2016. "Business Sustainability Research: A Theoretical and Integrated Perspective." *Journal of Accounting Literature*, 36: 48-64.

**Roberts, John.** 2004. *The Modern Firm*. Oxford: Oxford University Press.

**Rogers, Jean.** 2015. "Why Investors Should Look Beyond a Company's Financials." *Fortune*, August 11. http://fortune.com/2015/08/11/why-investors-should-look-beyond-a-companys-financials/.

**Rondinelli, Dennis, and Gyula Vastag.** 2000. "Panacea, Common Sense, or Just a Label? The Value of ISO 14001 Environmental Management Systems." *European Management Journal*, 18(5): 499-510.

**Schreck, Philipp.** 2011. "Reviewing the Business Case for Corporate Social Responsibility: New Evidence and Analysis." *Journal of Business Ethics*, 103: 167-88.

**Selmier, W. Travis, Aloysius Newenham-Kahindi, and Chang Hoon Oh**. 2015. "Understanding the Words of Relationships: Language as an Essential Tool to Manage CSR in Communities of Place." *Journal of International Business Studies*, 46(2): 153-79.

**Seuring Stefan, and Martin Müller.** 2008. "From a Literature Review to a Conceptual Framework for Sustainable Supply Chain Management." *Journal of Cleaner Production*, 16(15): 1699-1710.

**Singapore Exchange (SGX).** 2011. "Guide to Sustainability Reporting For Listed Companies." Singapore Exchange Limited. http://rulebook.sgx.com/net_file_store/new_rulebooks/s/g/SGX_Sustainability_Reporting_Guide_and_Policy_Statement_2011.pdf.

**Social Investment Forum.** 2012. "Report on Sustainable and Responsible Investing Trends in the United States." US SIF Foundation: The Forum for Sustainable and Responsible Investment.

**Spicer, Barry H.** 1978. "Investors, Corporate Social Performance and Information Disclosure: An Empirical Study." *The Accounting Review*, 53(1): 94-111.

**Starik, Mark, and Patricia Kanashiro.** 2013. "Toward a Theory of Sustainability Management: Uncovering and Integrating the Nearly Obvious." *Organization & Environment*, 26(1): 7-30.

**Strang, David.** 1990. "From Dependency to Sovereignty: An Event History Analysis of Decolonization 1870-1987." *American Sociological Review*, 55: 846-60.

**Suchman, Mark C.** 1995. "Managing Legitimacy: Strategic and Institutional Approaches." *Academy of Management Journal*, 20(3): 571-610.

**Tilling, Matthew V.** 2004. "Some Thoughts on Legitimacy Theory in Social and Environmental Accounting." *Social and Environmental Accountability Journal*, 24(2): 3-7.

**Tolbert, Pamela S., and Lynne G. Zucker.** 1983. "Institutional Sources of Change in the Formal Structure of Organizations: The Diffusion of Civil Service Reform, 1880-1935." *Administrative Science Quarterly*, 28(1), 22–39.

**Tonello, Matteo, and Thomas Singer.** 2015a. "The Business Case for Corporate Investment in ESG Practices." The Conference Board, July.

**Tonello, Matteo, and Thomas Singer.** 2015b. "Sustainability Practices 2015." The Conference Board. https://www.conference-board.org/pdfdownload.cfm?masterProductID=9311.

**Toronto Stock Exchange (TSX).** 2014. "A Primer for Environmental and Social Disclosure." March.

**United Nations Global Compact.** 2013. "Global Corporate Sustainability Report 2013." https://www.unglobalcompact.org/docs/about_the_gc/Global_Corporate_Sustainability_Report2013.pdf.

**Unruh, Gregory, David Kirin, Nina Kruschwitz, Martin Reeves, Holger Rubel, and Alexander Meyer zum Felde.** 2016. "Investing for a Sustainable Future." *MIT Sloan Management Review*. May. http://sloanreview.mit.edu/projects/investing-for-a-sustainable-future/.

**Verrecchia, Robert E.** 1983. "Discretionary Disclosure." *Journal of Accounting and Economics*, 5: 179-94.

**Verrecchia, Robert E.** 2001. "Essays on Disclosure." *Journal of Accounting and Economics*, 32(1-3): 97-180.

**Weber, Manuela.** 2008. "The Business Case for Corporate Social Responsibility: A Company-Level Measurement Approach for CSR." *European Management Journal*, 26(4): 247-61.

**Wijen, Frank.** 2014. "Means Versus Ends in Opaque Institutional Fields: Trading off Compliance and Achievement in Sustainability Standards Adoption." *Academy of Management Review*. 39(3): 302-23.

**World Commission on Environment and Development.** 1987. *Our Common Future*. Oxford: Oxford University Press.

**Wu, Meng-Wen, and Chung-Hua**. 2013. "Corporate Social Responsibility in the Banking Industry: Motives and Financial Performance." *Journal of Banking and Finance*, 37(9): 3529-47.

*The Journal of Business Inquiry* 2017, 16, Issue 1 (Special Issue), 88-101
http:www.uvu.edu/woodbury/jbi/articles
ISSN 2155-4072

# Assessing the Role of Entrepreneurial Competencies on Innovation Performance: A Partial Least Squares (PLS) Approach

*By* AINUL MOHSEIN BINTI ABDUL MOHSIN, HASLIZA ABDUL HALIM, NOOR HAZLINA AHMAD, AND NADIA FARHANA*

*For decades, entrepreneurial competencies have been viewed as essential for entrepreneurs to perform successfully and transform businesses. However, research on entrepreneurial competencies and their impact on innovative performance is very much lacking. Furthermore, research on these two variables among SMEs is also scarce. Thus, the intention of this study is to review the literature on entrepreneurial competencies and innovative performance and to investigate the relationships of these two variables within the Malaysian SME context with empirical evidence. A step by step SmartPLS approach is utilized to validate the model and find substantial support for the study's hypotheses.*

**Keywords**: Entrepreneurial Competencies, Innovative Performance, SME, SmartPLS

JEL Classification: L26, O31

## I. Introduction

Of late, the Malaysian SME sector has soared in tandem with global business development. The government has acknowledged that SMEs are the backbone of the Malaysian economy and continues to provide various support and programs to enhance SME productivity (PEMANDU, 2010). To unlock the growth potential of SMEs, the government has developed an extensive array of innovation know-how programs among the SMEs. Nevertheless, the 2016 Global Innovation Index for innovativeness ranked Malaysia at thirty-fifth for innovativeness (Cornell University *et al.*, 2016). In 2011, Malaysia was ranked at thirty one, and in 2012 it was ranked at thirty-two (INSEAD, 2012). The decreasing trend in innovation in Malaysia is a concern because it indicates that Malaysia is losing its footing in innovativeness. This information is supported by Che-Ha and Mohd-Said (2012); there is a dearth of information on SME innovative activities in Malaysia. Therefore, the Malaysian SMEs need to embrace innovativeness to stay relevant in today's global economy because their survival depends highly on their innovativeness, creativity, and entrepreneurship.

One of the ways for SMEs to become innovative is to rely on the entrepreneur's ability and creativity to innovate. There is a suggestion that the Malaysian SMEs do not have the prerequisite entrepreneurial competencies (ECs) to engage in activities which lead to innovative performance (IP). While it is true that entrepreneurs with highly developed entrepreneurial competencies are more likely to introduce innovation to their businesses (Mitchelmore and Rowley, 2010), it is

* Ainul Mohsein Binti Abdul Mohsin, corresponding author, Senior Lecturer, School of Management (International Business), Universiti Sains Malaysia,11800 USM Penang, Malaysia. Email:ainabdulmohsin@usm.my. Hasliza Abdul Halim, Associate Professor, School of Management (Organisational Behaviour), Universiti Sains Malaysia,11800 USM Penang, Malaysia. Email: haslizahalim@usm.my. Noor Hazlina Ahmed, Professor, School of Management (Organisational Behaviour), Universiti Sains Malaysia,11800 USM Penang, Malaysia. Email: hazlina@usm.my. Nadia Farhana, Doctoral Student, School of Management, Universiti Sains Malaysia,11800 USM Penang, Malaysia. Email:nadiafarhana@gmail.com.

postulated that some of the competencies have more influence than others on innovativeness among entrepreneurs. Given the fact that ECs are important to SME innovativeness, this paper argues that it is essential to understand the EC relationship to innovative performance in business practices. Therefore, the purpose of this paper is to investigate the relationships between these two variables – entrepreneurial competencies and innovative performance among the Malaysian SMEs – with empirical evidence.

## II. Literature Review

### *A. Entrepreneurial Competencies*

Frey and Ruppert (2013) categorize competencies as belonging to either personal or organizational categories. Personal competencies are abilities acquired by individuals such as knowledge, skills, abilities, experience, and personality, whereas organizational competencies are the embedded processes and structures that continue within an organization even when individuals leave the organization. These two categories are not mutually exclusive because all the personal techniques in the organization process or the work culture can be embedded in the organization. According to Spencer and Spencer (1993), competency is driven by the need to achieve superior performance and acquire economic gain and business success. Baum *et al.* (2001) emphasize that competency can be classified as either *specific* competency or *general* competency. *Specific* competency is technical and industrial skill whereas, *general* competency is organizational and opportunity recognition skill. Moreover, many studies have attributed the success of small businesses to the competencies of the entrepreneurs (Mitchelmore and Rowley, 2013). There is no denying that entrepreneurial competencies are vital to an organization's establishment, expansion, and success; however, the discussion of competencies in the entrepreneurial literature is still in its infancy (Brinckmann, 2008). Studies from Henderson and Cockburn (1994), Man *et al*. (2002), and Chandler and Jensen (1992) that spur from research productivity, competitive advantage and business performance have been closely associated to specific competencies; nevertheless the competencies needed to initiate and sustain the entrepreneurial process are less clearly identified (Rasmussen *et al.*, 2014).

Entrepreneurial competencies (ECs) have been identified as a specific group of competencies that are necessary to be implemented for successful entrepreneurship (Mitchelmore and Rowley, 2010). Since this study focuses on SMEs, ECs are scrutinized in detail to distinguish between general competencies and entrepreneurial competencies. Entrepreneurial competencies have often been associated with the occurrence of small and new businesses (Colombo and Grilli, 2005; Nuthall, 2006). The research of Chaston *et al.* (1999) on small organizations looks into the different modes of behavior which relate to and impact organizational capability. They also reveal that there have been only a few literature attempts to investigate the constructs on small organizations using quantitative techniques. Interestingly, scholars who specialize in the field of entrepreneurship make a distinction between managerial competencies and entrepreneurial competencies (Lerner and Almor, 2002; Chandler and Hanks, 1994a and 1994b). Man *et al.* (2002) clarify that ECs involve both managerial and entrepreneurial competencies and view ECs as the total ability package of an entrepreneur to perform the job role successfully and to also transform the business. The main strength of Man *et al.'s* (2002) argument is that ECs are exercised by individuals who start and transform their businesses. Hunt and Meech (1991) also stress that in the entrepreneurial context, the focus is not on an organization but on the individual. In addition to entrepreneurial

and managerial competencies, an entrepreneur needs to master the technical functional role too (Camuffo *et al.*, 2012). These findings are supported by Bruyat and Julien (2001) and Stevenson and Jarillo (1990), who conclude that entrepreneurial competencies are distinct individual abilities to identify, develop, and exploit opportunities and resources. Additionally, Johnson and Winterton's (1999) positive contribution to the study of entrepreneurship is that the range of competencies needed to run a small organization is vastly different from that of a large organization, from both the qualitative and quantitative aspects. This argument is consistent with the Resource-Based-Theory which states that the value creation of an organization is closely related to the capability of its managers in attaining and developing resources (Barney, 1991; Grant, 2010).

The EC constructs used to build the framework for this study are from Man (2001) and Ahmad (2007). These entrepreneurial competency constructs are opportunity, strategy, relationship, concepts, and technical expertise. According to Man *et al*. (2002), an entrepreneur who masters these entrepreneurial competencies will have a positive impact on the firm's decision making, business strategy, and capabilities, which include innovative ability (new products, services, and processes), quality (maintaining high quality and image), cost-effectiveness (competitive price), and organicity (flexible organization structure and system to achieve production speed and responsiveness). A study by Ahmad *et al*. (2010) on Malaysian SMEs in the service sector confirmed that ECs are also strong predictors of business success. The result validates Gibb's (2005) argument that SMEs' competitive advantage is achieved and sustained by the ability of the entrepreneur and not the size of the organization. Entrepreneurship also refers to a process of opportunity recognition and pursuit that leads to growth that creates value and bears risk. Thus, it is strongly associated with innovation. The study by Ahmad *et al*. (2010) clearly explains that entrepreneurs are capable of minimizing the negative impact of the business environment if they always equip themselves with the necessary competencies.

### *B. Innovative Performance*

Innovation is defined as the adoption of an idea or behavior that is new to an organization (Daft, 1978; Damanpour and Evan, 1984). The adoption of innovation is described as a process that includes generation, development, and implementation of new ideas or behaviors. Innovation is not only an adoption but also an adaptation of new information and practices, which leads to the ability to create new ideas and apply them to improvise new products, services, processes, and procedures (Bates and Khasawneh, 2005). The definition of innovation has evolved into different categories which include products, production methods and technologies, markets, services, and organizational structures, and an assumption is made that the source of information varies between different types of innovation (Freel and de Jong, 2009; Tödtling *et al.*, 2009). Innovation can either be radical, which is revolutionary and original (Green *et al*., 1995) or incremental, which is small improvements on an established process, product, or service. In sum, incremental innovations are improvements of existing products, services, processes, technical, or administrative conditions. Innovation, then, is multi-dimensional and is practiced by all types of organizations regardless of size because it is proven that organizations that are innovative have higher profits and market share (Prajogo and Ahmed, 2006). Many or most authors would agree that having distinguished entrepreneurial competencies is very important because such competencies will spur innovation.

Entrepreneurial competencies and innovations have always had a unique relationship. Schumpeter (1934) argued that technological and innovation change of a nation derived from the

entrepreneurs and innovation has been recognized as a competitive edge in business organizations. An individual who has developed his entrepreneurial competencies will eventually become involved in a special process of something new in the managerial, services, or product development process where he is willing to take on calculated risk (Ivanov and Bikbulatov, 2013). In this study, innovation involves the undertaking of actions to improve the products, processes, and procedures that help to increase the significance, usefulness, and performance of the products, processes, or procedures (Pinho, 2008), and innovative performance is defined as incremental product, service and process innovation because SMEs' innovation activities are more likely to be *ad hoc* or project driven (Hoffman *et al.*, 1998). Furthermore, SMEs are likely to focus on incremental innovation as posited by Oke *et al.* (2007).

## III. Theoretical Framework

Based on the aforementioned literature review, the proposed hypotheses are listed below. Entrepreneurial competencies constructs are represented by strategic, conceptual, opportunity, relationship, and technical categories and are viewed as possible predictors of innovative performance (Man *et al.*, 2002). This study argues that innovation is characteristic of entrepreneurial competencies (Edwards-Schacter *et al*., 2015) and can be learned as part of the personal development process. Furthermore, innovation relates to innovative behavior that triggers cognitive processes to produce novel business ideas (Bird, 2002). Given that entrepreneurial competency constructs are predictions of an entrepreneur's tendency towards innovation, it then can be anticipated that:

Hypothesis 1: *There will be a positive statistically significant relationship between conceptual competency and innovative performance.*

Hypothesis 2: *There will be a positive statistically significant relationship between opportunity competency and innovative performance.*

Hypothesis 3: *There will be a positive statistically significant relationship between relationship competency and innovative performance.*

Hypothesis 4: *There will be a positive statistically significant relationship between strategic competency and innovative performance.*

Hypothesis 5: *There will be a positive statistically significant relationship between technical competency and innovative performance.*

## IV. Methodology

This study is quantitative in nature, and the scope focuses on SMEs that are registered with the SME Corporation Malaysia. Since this study focuses on SME entrepreneurs, the definitions of SMEs provided by the Small and Medium Industries Development Corporation (SMECorp Malaysia, 2014) will be used to identify appropriate businesses for inclusion in the study. A survey instrument was developed by adapting items from previous literature that are reliable and validated to evaluate the relationships between the entrepreneurial competency constructs and innovative performance.

Since many SME entrepreneurs in Malaysia are comfortable in answering in the Malay language, the survey instrument was also translated into the Malay language. The translation in this study applied the extended parallel translation procedure known as collaborative translation. By applying this technique, the equivalence in meaning and the intended sense of statement was captured (Limpanitgul and Robson, 2009). Again, the translated questionnaire was pre-tested by the respondents to ensure the questions were the same in the English and Malay versions of the questionnaire.

Data were collected by sending mail surveys where the questionnaires were distributed to 1,000 companies in all states of Malaysia. The respondents were the business owners *cum* entrepreneurs of SMEs. This study is a cross-sectional type of inquiry. Two screening questions were used to check the sample for any form of response bias (Podsakoff *et al.*, 2012). A total of 191 replies were received. Twenty-four questionnaires were not usable because they were partially completed and did not meet the screening questions criteria. Therefore, only a sample size of N=167 was used for this study, resulting in a response rate of 16.7 percent. This response rate is considered satisfactory because it is a common scenario in Malaysia to obtain a standard response rate of between 15 and 20 percent from SMEs (Othman *et al*., 2001).

## V. Sample Profile

This study surveys SME organizations in Malaysia either from the manufacturing or the services sectors. From the total of respondents, 65 were from the manufacturing sector and 102 were from the services and other sectors. This study complies with the new SME definition made by SME Corporation Malaysia. From the profile, 100 percent of the respondents are owners and also entrepreneurs for their respective organizations. All respondents have been operating their businesses for 3 years or more. The majority of the respondents have been operating between 4 and 10 years (31.14 percent), 25.15 percent have been operating for 21 years or more, 23.95 percent have been operating for 3 years, 12.57 percent have been operating between 16 and 20 years, and only 7.19 percent have been operating between 11 and 15 years. Micro size businesses form the majority of the respondents of the survey (43.71 percent), followed by small size businesses (37.13 percent) and medium size businesses (19.16 percent). This is in sync with the Malaysian 2011 census that confirms the majority of SMEs are micro establishments (77.0 percent) (Jabatan Perangkaan Malaysia, 2012). The majority of the respondents are private limited companies (61.08 percent) followed by sole proprietorships (22.75 percent), and only 16.08 percent are partnerships. More than half of the respondents are male (62.28 percent). The biggest group of respondents in this study falls between 40-49 (28.14 percent) years old, and the highest level of education attained by most of the respondents is the university degree level (52.69 percent). The majority of the respondents are Malays (79.04 percent).

## VI. Findings and Discussion

The model was tested by applying the Structural Equation Modelling (SEM) procedure using SmartPLS which was developed by Ringle *et al.* (2010). The first step was to test for the convergent validity. Hair *et al*. (2010) suggested using the factor loadings, composite reliability, and average variance extracted to measure the convergence validity. Hair *et al.* (2014) state that an outer loading of 0.7 is acceptable because it is considered close enough to 0.708. Nevertheless, Hair *et al*. (2014) caution social sciences researchers to initially analyze the impact of deleting indicators between 0.40 and 0.70 on AVE and composite reliability. If deleting the outer loading does not increase the measure above the threshold, the reflective indicator should be retained. However, indicators with outer loading below 0.40 should always be eliminated from the scale (Hair *et al.,* 2012). The loadings after deleting some of the items exceeded the recommended value of 0.7 (Hair *et al*., 2010) as depicted in Table I. The Composite Reliability as depicted in Table 1 ranged from 0.871 to 0.944 which exceeded the recommended value of 0.7 (Hair *et al*., 2010). The average variance extracted, which reflects the overall amount of variance in the indicators accounted for by the latent construct, was in the range of 0.606 and 0.688, which also exceeded the recommended value of 0.5 (Hair *et al*., 2010).

**Table 1: Result of the Measurement Model**

| Constructs | Items | Loadings | AVE | CR | Deleted Due to Low Loading |
|---|---|---|---|---|---|
| **Strategic Competency** | ECS1 | 0.757 | 0.652 | 0.944 | |
| | ECS2 | 0.749 | | | |
| | ECS3 | 0.854 | | | |
| | ECS4 | 0.773 | | | |
| | ECS5 | 0.864 | | | |
| | ECS6 | 0.770 | | | |
| | ECS7 | 0.855 | | | |
| | ECS8 | 0.854 | | | |
| | ECS9 | 0.779 | | | |
| **Conceptual Competency** | ECC10 | 0.750 | 0.628 | 0.871 | ECC11 |
| | ECC14 | 0.828 | | | ECC12 |
| | ECC15 | 0.807 | | | ECC13 |
| | ECC16 | 0.784 | | | |
| **Opportunity Competency** | ECO17 | 0.853 | 0.681 | 0.895 | |
| | ECO18 | 0.803 | | | |
| | ECO19 | 0.850 | | | |
| | ECO20 | 0.794 | | | |
| **Relationship Competency** | ECR21 | 0.711 | 0.606 | 0.902 | |
| | ECR22 | 0.811 | | | |
| | ECR23 | 0.819 | | | |
| | ECR24 | 0.735 | | | |
| | ECR25 | 0.795 | | | |
| | ECR26 | 0.794 | | | |

**Table 1: Result of the Measurement Model: Continues**

| Constructs | Items | Loadings | AVE | CR | Deleted Due to Low Loading |
|---|---|---|---|---|---|
| **Technical Competency** | ECT27 | 0.810 | 0.688 | 0.898 | |
| | ECT28 | 0.795 | | | |
| | ECT29 | 0.835 | | | |
| | ECT30 | 0.875 | | | |
| **Innovative Performance** | IP1 | 0.808 | 0.638 | 0.898 | IP4 |
| | IP2 | 0.834 | | | |
| | IP3 | 0.806 | | | |
| | IP5 | 0.751 | | | |
| | IP6 | 0.792 | | | |

Note: Loadings > 0.7, AVE>0.5, CR>0.7.

The next step was to measure the discriminant validity to check if the construct is exclusive from the other constructs by empirical standard (Hair *et al*., 2014). For discriminant validity, the initial cross loadings of the items should correspond to their constructs and should be greater than the other constructs. Table 2 shows that there is sufficient discriminant validity for all constructs in this research. As shown in Table 2, all the square roots of the average variance extracted were higher than the correlations values in the row and the column, indicating adequate discriminant validity. In sum, the measurement model demonstrated adequate convergent validity and discriminant validity.

**Table 2: Discriminant Validity of Construct**

| | Conceptual | Opportunity | Relationship | Strategic | Technical | IP |
|---|---|---|---|---|---|---|
| **Conceptual** | **0.793** | | | | | |
| **Opportunity** | 0.781 | **0.825** | | | | |
| **Relationship** | 0.717 | 0.661 | **0.779** | | | |
| **Strategic** | 0.650 | 0.665 | 0.669 | **0.808** | | |
| **Technical** | 0.679 | 0.576 | 0.666 | 0.668 | **0.829** | |
| **IP** | 0.609 | 0.570 | 0.524 | 0.579 | 0.523 | **0.799** |

Note: Diagonals represent the square roots of the AVE while the off diagonal represents the correlations.

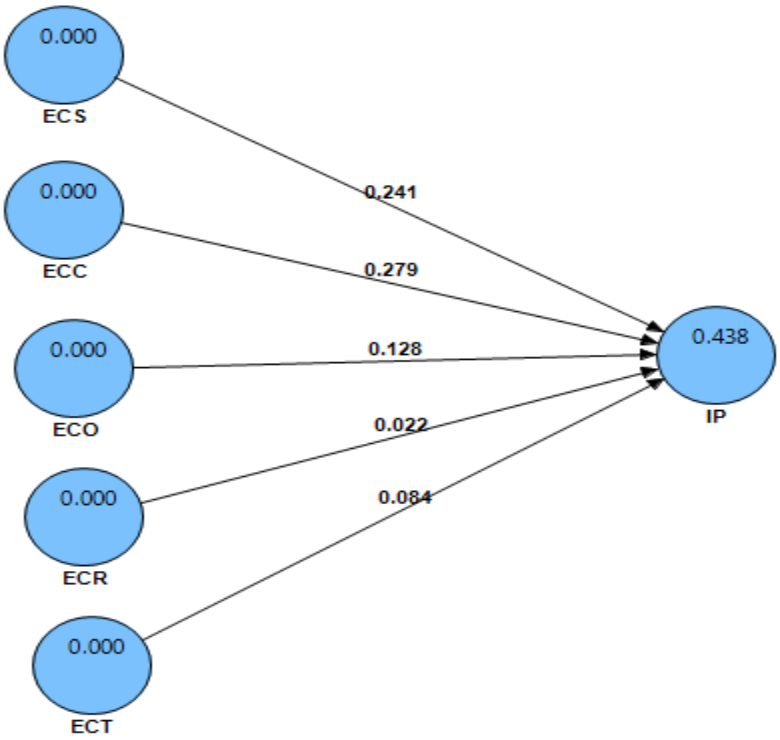
To test the hypotheses, an evaluation of the structural model was conducted. The analysis for the hypotheses was performed using the bootstrapping method. Table 3 shows that H1 and H4 are supported. Conceptual and strategic competencies are positively related to innovative performance. From Figure 1, the innovative performance $R^2$ value is 0.438, which suggests that 43.8 percent of the variance in the dependent variable is explained by EC.

**Table 3: Hypothesis Testing**

| Hypotheses | Relationships | Std Beta | Std Error | *t*-value | Decisions |
|---|---|---|---|---|---|
| **H1** | Conceptual -> IP | 0.279 | 0.136 | 2.056** | Supported |
| **H2** | Opportunity -> IP | 0.128 | 0.120 | 1.068 | Not Supported |
| **H3** | Relationship -> IP | 0.022 | 0.094 | 0.228 | Not Supported |
| **H4** | Strategic -> IP | 0.241 | 0.092 | 2.617*** | Supported |
| **H5** | Technical -> IP | 0.084 | 0.085 | 0.993 | Not Supported |

Note: * p<0.10 (1.28), ** p<0.05 (1.645),*** p<0.01(2.33) one tail. Hypotheses are supported.

**Figure 1: Structural Model**




Conceptual competency is positively related to innovative performance with a beta value of 0.279, *t*-value of 2.056 and ρ<0.05 significance level. Similarly, strategic competency is positively related to innovative performance with a beta value of 0.241, *t*-value of 2.617 and ρ<0.01 significance level. Durkan *et al.* (1993), Mitton (1989), and Snell and Lau (1994) categorized business strategy, sustainability, and systematic and strategic planning as strategic competency. Baum (1994), Bird (1995), McClelland (1987), and Mitton (1989) define conceptual competency as coping with uncertainty risk, cognitive and analytical decision making, problem solving, learning, and innovative skills.

Conceptual and strategic thinking are very much associated as both require the ability to understand relationships and draw the elements together into a coherent framework. Both competencies require the ability to use key pieces of information to predict trends and to predict

the outcome of a complex situation. From the literature produced, Santandreu-Mascarell *et al.* (2013) conclude that innovation is the result of the development of an idea into the market which is processed by individuals highly competent in strategic and conceptual thinking. Thus, there is some evidence that strategic and conceptual competencies lead to innovation behavior.

Contrary to expectations, this study's result shows that the correlation of opportunity competency, relationship competency, and technical competency to innovative performance is not statistically significant. Hence, care needs to be exercised in making sense of the result. The likely explanation for this result is that budget and cash flow are constant constraints for many Malaysian SMEs, making it difficult for them to afford entertainment and business expenses to facilitate client engagement and business networking. Secondly, large organizations are given more attention and opportunities by the government and the business community compared to SMEs due to their financial stability and track record. Moreover, large organizations have established their reputations by their branding and marketing strategies. Due to these constraints, SMEs in Malaysia may be less likely to invest heavily in relationship building with the business community and government agencies. Furthermore, in a hierarchically ordered society, the CEOs of business entities are expected to be the contact points for all the higher level appointments, and this can create time constraints and limitations on relationship building among SMEs.

Another conceivable reason for the non-significant opportunity competency may be due to the basic concept of *malu* (shame) in the culture of the Malays in Malaysia (Abdullah, 1993). Malay respondents constituted 79.04 percent in this study. To the Malays, *malu* is an element of basic goodness and virtue in society, and in one study Malays were reported to score more highly on self-consciousness than other ethnic groups (Mastor *et al*., 2000; McCrae and Terracciano, 2005). Malays are found to be *malu* to ask for favors and opportunities. Therefore, it is likely that opportunity competency is less developed among the Malay SMEs due to the reasons given. However, mindful of the above discussion, it is plausible to conclude that entrepreneurs with superior conceptual and strategic competencies are more likely to engage in competitive intelligence, which may help them in enhancing their innovative performance.

The insignificant relationship between technical and innovative performance results may also be linked to budget constraints experienced by Malaysian SMEs. The majority of the SME establishments in Malaysia are categorized as micro establishments. Furthermore, investing in technical competency requires time and capital. Perhaps many SMEs contend that in a globalized marketplace that is turbulent and dynamic and characterized by competitiveness and rapid technology innovation, replication of others' products and services is a more effective option because it reaps quick profit and benefits.

## VII. Conclusion and Implication

The objective of this study is to examine EC constructs and innovative performance relationship in the Malaysian SME context. This study makes several contributions to the literature on strategic management. Firstly, this study extends the pool of literature by examining several EC constructs and innovative performance. Secondly, it is vital for government agencies to understand the SME entrepreneurial competencies in Malaysia because of its unique historical background, beliefs and practices, political systems, and cultures. The findings from this study clearly show that ECs are indeed important for Malaysian SMEs' economic success. The success of Malaysian SMEs is very much affected by the entrepreneurs' competencies in accelerating innovative performance. From this study, there is a consensus that some of the entrepreneurial

competencies influence innovativeness. Thus, entrepreneurs must have the right competencies to undertaking innovative projects. SMEs are advised to broaden their competencies to move their businesses forward, or they are at risk of being left behind in today's borderless global market. It is important for the SMEs to build these competencies by adopting new techniques and changing deep-rooted systems. Government agencies can initiate awareness campaigns to promote ECs that assist in innovative performance among the SMEs. Finally, universities can assist SMEs in developing their competencies by providing and building an across-the-board network system and incubation centers that provide access to resources. Moreover, by championing a meticulous and accurate competency database, it can become a reference point and a blueprint for providing support and training programs that are more relevant for today's millennial entrepreneurs. The database can be a tool in assessing the existing entrepreneurs' competencies and highlighting areas where change is needed to improve existing training programs and the level of support provided.

While the research design was tailored to address the hypotheses and focus on the significant variables, this study is not without limitations. Firstly, this study relied on cross-sectional data. It only considers the current state of SMEs and does not look further beyond the short and long term effect of entrepreneurial competencies on SME innovative performance. Future study in this area would benefit from using a longitudinal study methodology by which the degree of entrepreneurial competencies can be measured over time to entirely understand the study's framework.

## References

**Abdullah, Mohamed Mansor.** 1993. "Konsep Malu dan Segan Orang Melayu" (Self-Consciousness and the Shame Concept in Malay People). In *Psikologi Melayu,* ed. Abdul Halim Othman, 244-94. Kuala Lumpur, Malaysia: Dewan Bahasa dan Pustaka.

**Ahmad, Noor Hazlina.** 2007. *A Cross-Cultural Study of Entrepreneurial Competencies and Entrepreneurial Success in SEMs in Australia and Malaysia.* Ph.D. Dissertation. University of Adelaide, Australia.

**Ahmad, Noor Hazlina, T. Ramayah, Carlene Wilson, and Liz Kummerow.** 2010. "Is Entrepreneurial Competency and Business Success Relationship Contingent Upon Businesss Environment?: A Study of Malaysian SMEs." *International Journal of Entrepreneurial Behavior & Research,* 16(3): 182-203.

**Barney, Jay.** 1991. "Firm Resources and Sustained Competitive Advantage." *Journal of Management,* 17(1): 99-120.

**Bates, Reid, and Samer Khasawneh.** 2005. "Organizational Learning Culture, Learning Transfer Climate and Perceived Innovocation in Jordanian Organizations." *International Journal of Training and Development,* 9(2): 96-109.

**Baum, John Robert.** 1994. *The Relation of Traits, Competencies, Vision, Motivation and Strategy to Venture Growth.* Ph.D. Dissertation, University of Maryland, College Park, MD.

**Baum, John Robert, Edwin A. Locke, and Ken G. Smith.** 2001. "A Multidimensional Model of Venture Growth." *The Academy of Management Journal,* 44(2): 292-303.

**Bird, Barbara.** 1996. "Toward a Theory of Entrepreneurial Competency." In *Advances in Entrepreneurship, Firm Emergence, and Growth,* ed. Jerome Katz and Robert Brockhaus, 2: 51-72. Greenwich, CT: JAI press.

**Bird, Barbara J.** 2002. "Learning Entrepreneurship Competencies: The Self-Directed Learning Approach." *International Journal of Entrepreneurship Education,* 1(2): 203-77.

**Brinckmann, Jan.** 2008. *Competence of Top Management Teams and Success of New Technology-Based Firms: A Theoretical and Empirical Analysis Concerning Competencies of Entrepreneurial Teams and the Development of their Ventures*. Wiesbaden: Gabler.

**Bruyat, Christian, and Pierre-André Julien.** 2001. "Defining the Field of Research in Entrepreneurship." *Journal of Business Venturing*, 16(2): 165-80.

**Camuffo, Arnaldo, Fabrizio Gerli, and Paolo Gubitta.** 2012. "Competencies Matter: Modeling Effective Entrepreneurship in Northeast of Italy Small Firms." *Cross Cultural Management: An Interntional Journal*, 19(1): 48-66.

**Chandler, Gaylen N., and Steven H. Hanks.** 1994a. "Founder Competence, the Environment and Venture Performance." *Entrepreneurship Theory and Practice*, 18(3): 77-90.

**Chandler, Gaylen N., and Steven H. Hanks.** 1994b. "Market Attractiveness, Resource-based Capabilities, Venture Strategies, and Venture Performance." *Journal of Business Venturing*, 9(4): 331-49.

**Chandler, Gaylen N., and Erik Jensen.** 1992. "The Founder's Self-assessed Competence and Venture Performance." *Journal of Business Venturing*, 7(3): 223-26.

**Chaston, Ian, Beryl Badger, and Eugene Sadler-Smith.** 1999. "Organisational Learning: Research Issues and Application in SEM Sector Firms." *International Journal of Entrepreneurial Behaviour & Research*, 5(4): 191-203.

**Che-Ha, Norbani, and Saad Mohd-Said.** 2012. "Innovation Practices by Malaysian SEMs." In *Malaysian SEMs in the New Economy*, ed. Norbani Che-Ha and Amir Mahmood. 39-55. Malaysia: Cengage Learning.

**Colombo, Massimo G., and Luca Grilli.** 2005. "Founders' Human Capital and the Growth of New Technology-based Firms: A Competence-Based View." *Research Policy*, 34(6): 795-816.

**Cornell University, INSEAD, and World Intellectural Property Organization.** 2016. "Global Innovation Index 2016 Rankings." In *The Global Innovation Index 2016-Winning with Global Innovation*, ed. Soumitra Dutta, Bruno Lanvin, and Sacha Wunsch-Vincent. Geneva, Switzerland.

**Daft, Richard L.** 1978. "A Dual-Core Model of Organizational Innovation." *The Academy of Management Journal*, 21(2): 193-210.

**Damanpour, Fariborz, and William M. Evan.** 1984. "Organizational Innovation and Performance: The Problem of 'Organizational Lag'." *Administrative Science Quarterly*, 29(3): 392-409.

**Durkan, P., R. Harrison, P. Lindsay, and E. Thompson.** 1993. "Competence and Executive Education and Development in an SME Environment." *Irish Business and Administrative Research*, 14(1): 65-80.

**Edwards-Schachter, Mónica, Ana Garciá-Granero, Mabel Sánchez-Barrioluengo, Henry Quesada-Pineda, and Nabil Amara.** 2015. "Disentangling Competences: Interrelationships on Creativity, Innovation and Entrepreneurship." *Thinking Skills and Creativity*, 16: 27-39.

**Freel, Mark, and Jeroen P.J. de Jong.** 2009. "Market Novelty, Competence-seeking and Innovation Networking." *Technovation*, 29(12): 873-84.

**Frey, Andreas, and Jean-Jacques Ruppert.** 2013. "Structuring and Detecting Competence." In *From Diagnostics to Learning Success*, ed. Susanne Weber, Frank Achtenhagen and Fritz Oser, 1: 185-198. Rotterdam: Sense Publishers.

**Gibb, Allan A.** 2005. "The Entrepreneur as the Core Competence of the Firm." In *European Forum for Management Development*. Brussels: Entrepreneurship Bulletin.

**Grant, Robert M.** 2010. *Contemporary Strategy Analysis*, 7th ed., Chinchester, UK: John Wiley & Sons Ltd. (Original published in 1988).

**Green, Stephen G.**, **Mark B. Gavin, and Lynda Aiman-Smith.** 1995. "Assessing a Multidimensional Measure of Radical Technological Innovation." *IEEE Transactions on Engineering Management,* 42(3): 203-14.

**Hair, Joseph F.**, **G. Thomas M. Hult, Christian M. Ringle, and Marko Sarstedt.** 2014. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* Los Angeles: SAGE Publication, Inc.

**Hair, Joseph F.**, **Marko Sarstedt, Torsten M. Pieper, and Christian M. Ringle.** 2012. "The Use of Partial Least Squares Structural Equation Modeling in Strategic Management Research: A Review of Past Practices and Recommendations for Future Applications." *Long Range Planning,* 45(5-6): 320-40.

**Hair, Joseph F.**, **Willian C. Black, Barry J. Babin, and Rolph E. Anderson.** 2010. *Multivariate Data Analysis*. 7th ed. Upper Saddle River, NJ: Pearson Education, Inc.

**Henderson, Rebecca, and Iain Cockburn.** 1994. "Measuring Competence? Exploring Firms Effects in Pharmaceutical Research." *Strategic Management Journal,* 15 (Supplement S1): 63-84.

**Hoffman, Kurt, Milady Parejo, John Bessant, and Lew Perren.** 1998. "Small Firms, R&D, Technology and Innovation in the UK: A Literature Review." *Technovation,* 18(1): 39-55.

**Hunt, Carol**, **and Linda Meech.** 1991. "Competencies and Human Resource Management in the Department of Immigration, Local Government and Ethnic Affairs." *Australian Journal of Public Administration,* 50(4), 444-51.

**INSEAD.** 2012. "The Global Innovation Index 2011 Accelerating Growth and Development." https://www.globalinnovationindex.org/userfiles/file/GII-2011_Report.pdf (accessed June 21, 2016).

**Ivanov, V.G., and R.R. Bikbulatov.** 2013. "The Development of Gifted Students Personality in the Process of Their Training for Getting Engineering Education." *Herald Kazan State Technological University*, 16: 142-45.

**Jabatan Perangkaan Malaysia.** 2012. *Banci Ekonomi 2011 – Profil Perusahaan Kecil dan Sederhana.* Putrajaya, Malaysia: Jabatan Perangkaan Malaysia.

**Johnson, Steven, and Jonathan Winterton.** 1999. *Management Skills Task Force Research Paper 3.* London: Department for Education and Employment.

**Lerner, Miri, and Tamar Almor.** 2002. "Relationshiops Among Strategic Capabilities and the Performance of Women-Owned Small Ventures." *Journal of Small Business Management,* 40(2): 109-25.

**Limpanitgul, Thanawut, and Matthew J. Robson**. 2009. "Methodological Considerations in a Quantitative Study Examining the Relationship Between Job Attitudes and Citizenship Behaviors." Paper presented at the 18th EDAMBA Summer Academy, Soreze, France.

**Man, Wing-yan Thomas.** 2001. *Entrepreneurial Competencies and the Performance of Small and Medium Entreprises in Hong Kong Services Sector.* Ph.D. Dissertation. The Hong Kong Polytechnic University, Hung Hom, Kowloon, HK.

**Man, Thomas W.Y., Theresa Lau, and K. F. Chan**. 2002. "The Competitiveness of Small and Medium Enterprises: A Conceptualization with Focus on Entrepreneurial Competencies." *Journal of Business Venturing*, 17(2): 123-42.

**Mastor, Khairul A.**, **Putai Jin, and Martin Cooper.** 2000. "Malay Culture and Personality: A Big Five Perspective." *American Behavioral Scientist*, 44(1): 95-111.

**McClelland, David C.** 1987. "Characteristics of Successful Entrepreneurs." *Journal of Creative Behavior,* 21(3): 219-33.

**McCrae, Robert R.**, **and Antonio Terracciano.** 2005. "Personality Profiles of Cultures: Aggregate Personality Traits." *Journal of Personality and Social Psychology,* 89(3): 407-25.

**Mitchelmore, Siwan, and Jennifer Rowley.** 2010. "Entrepreneurial Competencies: A Literature Review and Development Agenda." *International Journal of Entrepreneurial Behavior & Research,* 16(2): 92-111.

**Mitchelmore, Siwan, and Jennifer Rowley.** 2013. "Entrepreneurial Competencies of Women Entrepreneurs Pursuing Business Growth." *Journal of Small Business and Enterprise Development,* 20(1): 125-42.

**Mitton, Daryl G.** 1989. "The Complete Entrepreneur." *Entrepreneurship Theory and Practice,* 13(3): 9-19.

**Nuthall, Peter Leslie.** 2006. "Determining the Important Management Skill Competencies: The Case of Family Farm Business in New Zealand." *Agricultural Systems,* 88(2-3): 429-50.

**Oke, Adegoke, Gerard Burke, and Andrew Myers.** 2007. "Innovation Types and Performance in Growing UK SMEs." *International Journal of Operations & Production Management,* 27(7): 735-53.

**Othman, Rozhan, Rohayu Abdul-Ghani, and Rasidah Arshad**. 2001. "Great Expectations. CEO's Perception of the Performance Gap of the HRM Function in the Malaysian Manufacturing Sector." *Personnel Review,* 30(1): 61-80.

**PEMANDU.** 2010. *Economic Transformation Programme. A Roadmap for Malaysia.* Malaysia: Performance Management and Delivery Unit, Prime Minister's Department.

**Pinho, J.S.** 2008. "TQM and Performance in Small Medium Enterprises: The Mediating Effect of Customer Orientation and Innovation." *International Journal of Quality & Reliability Management.* 25(3): 256-75.

**Podsakoff, Philip M.**, **Scott B. MacKenzie, and Nathan P. Podsakoff.** 2012. "Sources of Method Bias in Social Science Research and Recommendations on How to Control It." *Annual Review of Psychology,* 63: 539-69.

**Prajogo, Daniel I.**, **and Pervaiz K. Ahmed.** 2006. "Relationships Between Innovation Stimulus, Innovation Capacity, and Innovation Performance." *R&D Management,* 36(5): 499-515.

**Rasmussen, Einar, Simon Mosley, and Mike Wright.** 2014. "The Influence of University Departments on the Evolution of Entrepreneurial Competencies in Spin-off Ventures." *Research Policy,* 43(1): 92-106.

**Ringle, Christian M.**, **Sven Wende, and Alexander Will.** 2010. "Finite Mixture Partial Least Squares Analysis: Methodology and Numerical Examples." In *Handbook of Partial Least Squares,* ed. Vincenzo Esposito Vinzi, Wynne W Chin, Jörg Henseler, and Huiwen Wang. 8: 195-218. Berlin, Heidelberg: Springer-Verlag.

**Santandreu-Mascarell, Cristina, Dolores Garzon, and Helena Knorr.** 2013. "Entrepreneurial and Innovative Competences, Are They the Same?" *Management Decision,* 51(5): 1084-95.

**Schumpeter, Joseph Alois.** 1934. *The Theory of Economic Development: An Inquiry into profits, Capital, Credit, Interest and the Business Cycle.* Cambridge, MA: Harvard University Press.

**SMECorp Malaysia.** 2014. New Definition of Small and Medium Enterprises (SEMs). http://www.smecorp.gov.my (accessed August 30, 2016).

**Snell, Robin, and Agnes Lau.** 1994. "Exploring Local Competences Salient for Expanding Small Businesses." *Journal of Management Development,* 13(4): 4-15.

**Spencer, Lyle M.**, **and Signe M. Spencer.** 1993. *Competence at Work: Model for Superior Performance.* New York: Wiley.

**Stevenson, Howard H., and J. Carlos Jarillo.** 1990. "A Paradigm of Entrepreneurship: Entrepreneurial Management." *Strategic Management Journal,* 11: 17-27.

**Tödtling, Franz, Patrick Lehner, and Alexander Kaufmann.** 2009. "Do Different Types of Innovation Rely on Specific Kinds of Knowledge Interactions?" *Technovation,* 29: 59-71.