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Global Scholars Tackle Environmental Investing

Angelo A. Calvello, PhD
Editor in Chief

The 2011–2012 class of JEI Scholarship applicants demonstrated the global interest in environmental investing. We had 33 applications from over 23 countries. The Selection Committee members had their work cut out for them in evaluating the applications. In the end, the Committee, chaired again by Dr. Alex Rau, selected a paper by Zhan Zhou, a Chinese national completing a Master of Environmental Studies degree, which is offered through the College of General Studies in cooperation with the Institute for Environmental Studies at the University of Pennsylvania. However, this year's applicant pool was so commendable that the Committee and the Editorial Board of the JEI decided to publish papers from several graduate students. Their academic work covers topics as diverse as a dynamic comparison of green and non-green portfolios and an analysis of building ecological entrepreneurship at local levels, demonstrating the genuine interdisciplinary and global nature of discourse surrounding environmental investing. Zhan Zhou, or Luke as we have come to know him, demonstrated exceptional insight and rigor in an analysis of drinking water issues and policies in rural China. In his paper, "Challenges and Opportunities from the Rural Drinking Water Supply in China," Luke examines investment opportunities and programs sponsored by private companies in cooperation with governments and NGOs, and considers their applicability to the over 600 million Chinese rural residents, many of whom need higher quality drinking water.

I know I speak for both the Editorial and Advisory Boards when I say we are proud to support this scholarship. The paralysis and myopia of our political leaders—many of whom are in the grip of special interests—demonstrates that we continue to burden the next generation with the challenges associated with climate change. In many ways, these young scholars represent our best hope.

In addition to the manuscripts from the scholarship applicants, you'll find three insightful book reviews in this issue. Of particular interest to many readers will be the review of "Lenses and Clocks," a collaborative effort between the United Nations Environment

Programme Finance Initiative (UNEP FI), the International Institute for Sustainable Development (IISD), and The Blended Capital Group (TBCG). I would encourage everyone to read the primary source http://www.iisd.org/publications/pub.aspx?pno=1623, for it challenges the consensus thinking on the relevance of sustainable finance and investment.

I would also like to thank my old friend, Dr. Ron Nahser, for weaving a leitmotif into his multi-text review. In 2003, Ron, as Provost at the Presidio Graduate School, pioneered the field of sustainable management education. He remains a beacon of critical thinking in this area.

In closing, I also want to express our gratitude to BE Bioenergy Group AG for its continued support of the *JEI.* The Group's commitment allows us to maintain the *JEI*'s status as an open-access publication and resource for significant scholarly discourse on environmental investing.

Best wishes,

Dr. Angelo Calvello

Challenges and Opportunities from the Rural Drinking Water Supply in China

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Abstract

Challenges and Opportunities from the Rural Drinking Water Supply in China

Water, contrary to its importance and necessity to human health and economic development, has long been an undervalued investment focus, especially of private investors, whose investment in water has been modest relative to the growing investment in telecommunications, energy, and other high-margin sectors. This is particularly the case in low-income regions of developing countries, where the investment in water is most needed.

In this article, I examine current Chinese rural drinking water policies and situations. As the country with the largest global population, of which almost 50% live in rural areas, China is facing the huge challenge of providing safe drinking water to everyone. In addition to its scarce water resources per capita, both ground- and surface-water sources are being heavily polluted. At the same time, the BOP (Bottom of the Pyramid) business model is playing an increasingly critical role in tackling the drinking water issues in other developing countries. Potentially, BOP business can bring down the technology cost, engage closely with local communities, and stimulate innovation. Three BOP businesses are introduced in this article and their experiences and challenges are summarized. A general feasibility study replicating this business model in China is also conducted. The analysis suggests that although China has a huge demand, there are also some significant barriers and obstacles to tapping the enormous market potential.

Challenges and Opportunities from the Rural Drinking Water Supply in China

In China, roughly 50% of its current population lives in rural areas, with an average annual income per capita of around RMB 6,977 ($1073). This annual income almost doubles the income rate of 2005, but there are still 90 million people living below the poverty line in China. Coupled with increasing its income and living standards, China has accomplished part of its UN Millennium Development Goals (MDG) target, which is to "halve, by 2015, the proportion of the population without sustainable access to safe drinking water" (China Water 2011, 1-83). However, as a necessity of human health and economic growth, safe drinking water still remains a challenge for China. Having access to safe drinking water is also closely associated with seven other MDGs, including achieving gender equality, combating extreme poverty, providing primary education, and so on. In 2010, there were still 150 million people among the 715 million rural inhabitants without access to secure drinking water.

With the fast economic growth and industrialization of recent years, new water issues are also emerging. In addition to having an already low water resource per capita (one-quarter of the world average level), an increasing number of rural areas are now being heavily polluted by industrial and human wastes. Frequent extreme weather conditions, such as droughts and floods most likely triggered by climate change, are affecting the southern and northern agriculture areas and have severely damaged agriculture production and threatened national food security. China still has a long way to go to achieve its goal of drinking water security, which is to have drinking water accessible in every home. Given the importance of providing safe drinking water in rural areas and its priority among China's national policies, an exploration of the water supply and water technology market could be a major potential investment opportunity for private investors and operators.

This article is organized as follows:

- A brief analysis of water supply and demand situations in China's rural areas is presented in order to understand the issues.
- Case studies of three international companies introduce Bottom of the Pyramid (BOP) business models of rural water supplies.
- A feasibility study compares the key variables and other important factors of selected China provinces with those of the countries where the BOP businesses were carried out.
- The opportunities and challenges that confront businesses interested in investing in China's rural water supply are summarized in the conclusion.

Current China Rural Drinking Water Supply Situations

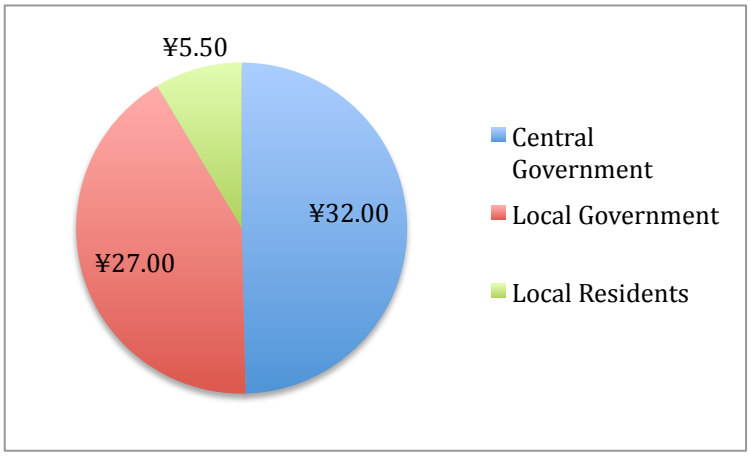
Providing safe drinking water in rural areas has been an important component of the Chinese government's poverty alleviation policies, therefore a comprehensive overview of current and past government strategies for rural drinking water is key to understanding the current rural drinking water supply situations in China. Additionally, a brief introduction to NGO and private investment roles is included because of their increasingly important role in this sector.

Government Strategies

The government of China is currently the dominant player in solving the rural drinking-water supply problems (Figure 1). Thanks to its strong and ambitious poverty alleviation policies, the population with insecure drinking water dropped from 311.76 million in 2005 to 200 million in 2008 according to the "11th Five-Year Plan on Rural Drinking Water Report" (China Water 2011, 1–83). It is estimated that by the end of 2010, this number dropped further to the level of 150 million. The projected total investment in the 11th Five-Year Plan was 64.5 billion RMB, but the actual investment during 2005–2010 amounted to approximately 100.9 billion RMB (China Water 2011, 1–83).

Figure 1. Breakdown of Total Investment (Planned) in Rural Drinking Water Supply Projects during 2006–2010 (in Billions)

The five-year (2006–2010) national investment plan for the rural drinking water supply projects is shown on the right.



Source: The author.

According to the "Decisions on Investment Institutional Reform," government spending should focus on national security, fixing market inefficiency in economic and social areas by providing public goods, and constructing basic rural infrastructure. Various other national policy documents further emphasize the importance of rural water safety. As a

result, about 58.5% of the total investment made during 2005–2010 was from the central government, 35% of the investment was financed by the provincial and local government, and the remaining 6.5% was expected to be provided by the rural villagers who benefited. The exact ratio differs according to the local economic situations, with a higher ratio of government spending occurring in less developed areas.

One very important factor that contributes to China's success in achieving the MDG is its political structure. The central government sets a target in the rural water sector for the provincial government. The performance of local government in solving rural water problems is sometimes closely bound to the annual evaluation of the local officials. This approach is unique to the Chinese model and has been deployed during the past 30-year economic development. In this model, the central government sets the economic growth targets and disaggregates to the provincial level and subsequently the city level; the evaluation of the local officials will be highly dependent on the GDP growth. Although economic growth is weighed much more heavily than achievements in water supply in such an evaluation, with the recent circular economic strategies from the central government, the emphasis on sustainable development, environmental performance, and the quality of rural life are becoming increasingly important.

The water supply projects constructed in recent years can be roughly summarized into three categories: centralized water supply, decentralized water supply, and water shortage and pollution control projects.

Centralized Water Supply. By the end of 2004, about 362 million people (38% of the rural population) had access to centralized water supply systems, with each system supporting at least 200 people or providing 20m^3 of water every day (China Water 2011, 1–83). During 2005–2010, there were more than 200,000 additional centralized water supply systems built around rural China. The rural centralized water supply systems are generally small. Only about 13% of them supply more than 200m^3 water per day (China Water 2011, 1–83). Ninety-one percent of them are village-based, with underground water and streams as their water sources. Many projects were contracted to the local villagers and charged on the basis of headcounts or the quantity of water consumed. Among all centralized water supply systems, the majority of them are simply composed of water resources and pipelines; only around 8% of them are equipped with water treatment and quality monitoring systems. Additionally, local community members' behavior is a barrier to achieving safe drinking water objectives. The water supply capacity far exceeds the water demand in many cases because villagers with lower income often choose to pay only for drinking and cooking water and fall back to old free water sources for other water uses (Lin and Zheng 2009, 81–86). In some remote regions where education levels are

low, villagers seem uninterested in the quality of the water. It was found in one NGO project that even though there were pigs wading at the source of a gravity-fed pipeline, local villagers still used it for their drinking water needs (Geoffrey 2011, 1–101). In other cases, local villagers just don't have a clear concept of water quality; they merely consider clarity as the standard for potability and believe that disinfection is an unnecessary process (Junling et al. 2009).

Decentralized Water Supply. Forty-nine percent of the rural population uses decentralized water supply systems. Most of the systems are built and managed by the households themselves and generally lack water quality monitoring systems (China Water 2011, 1–783). Sixty-seven percent of the decentralized water systems are shallow wells with hand-pumps or electric pumps that are distributed in the villages where underground water is easily accessed. Nine percent are from stream water diversion and three percent are from rainwater harvesting (China Water 2011, 1–83). Water quality remains the main challenge for the decentralized water systems and is generally worse than that of centralized water systems. Wastewater treatment capacity is extremely low in rural areas or even missing in most places; livestock manures, toilet water, and sewages are often directly disposed without any penetrating treatment and pollute the shallow underground water. In Si Chuan province, almost all of the 4,427 towns did not have wastewater treatment plants in 2009. More than 10 billion tons of wastewater and sewages were disposed directly into the environment (Wenguo and others 2012, 109–115). Fertilizer from agriculture is another important groundwater pollution source. Because of decreasing underground water resources and pressures from industrial or domestic pollutions, these decentralized water supply systems are becoming less and less reliable and sustainable.

Water Shortage and Water Pollution Control. According to a survey on rural drinking situations in China conducted in 2004, 90 million people in rural China—or 30% of the population facing insecure drinking water—don't have sufficient and accessible water resources (China Water 2011, 1–83). Some of them have no water supply system or have dysfunctional water systems; the rest are simply living in water- stressed areas. They have to walk long distances daily to fetch water directly from rivers, streams, ponds, or other villages. In some western provinces such as Qinghai, Guizhou, Guangxi, Shaanxi, and Chongqing, the number of people without sufficient safe drinking water even reached 40% of their total population during some drought periods (China Water 2011, 1-83). Some of the seasonal drought became even more severe, probably due to the climate change in recent years.

The other 70% of the population affected by water insecurities face various water pollution issues such as from fluorine, arsenic, and industrial pollution. These water

shortage and pollution problems cannot be solved by simple centralized or decentralized water supply systems. They requires holistic drinking water solutions, ranging from consistent water quality testing to local community education and engagement.

International Organizations and NGOs

Several major philanthropic contributions from international organizations have been made in China during the past two decades. Since 1985, the World Bank loaned a total of $370 million to the National Public Sanitation Agency and some local governments to implement "China rural water supply and environmental health projects," providing 24.37 million people with safe drinking water (China Water 2011, 1–83). Since 1991, UNICEF, the Ministry of Water Resources of China, and local governments cooperated on three phases of rural drinking water projects. Other major philanthropic projects included rural water supply and sanitation projects that are cooperating with the Department for International Development (DFID) from Britain and technical support from the National Land Resource Department. The role of the international organizations is still limited to the scope of financial assistance.

China does not have a very long history of NGO activities. The projects with influence include donation activities organized by the All-China Women's Federation that raised more than RMB 150 million and water and sanitation projects implemented by Singapore NGO Lien Aid (China Water 2011, 1–83; Lien Aid 2012). There are other active domestic or international NGOs, but the scale is relatively small and the focus is narrowed down to only several local villages (Geoffrey 2011, 1–101).

Private Investment

The 11th Five-Year Plan expected that 6%–9% of financial resources would come from the private sector, which would include tariffs from the benefited villagers and investments from the private operators. There is a very limited amount of published research on the topic of rural water privatization, but existing research has shown the importance of private players in the rural water supply market. A 2008 case study from Shandong Province proves the feasibility of employing the market mechanism in providing a rural water supply. The centralized water supply projects run by the local villagers had both good financial and good project performances. Local governments provided various financial incentives to cover a large portion of the facility cost. Many other rural places in China have given the private sector permits to run the water supply business as well (Lin and Zheng 2009, 81–86). However, the study also suggests that the market is still under the constraints of government planning, business permits, tariff regulations, and so on. There is no general management process that can be applied

nationally, and the villagers have lower water consumption per capita; thus, it is difficult for operators to realize economies of scale by expanding rapidly into other locations. The town in the case study is among the top 100 wealthy towns in China. This easy access to financing is not common in other parts of China. Additionally, the cost of financing for private operators can be as high as 9%–13%, which is higher than the return on investment. The last but not the least challenge for the local water business operator is the high cost of operation and maintenance, which is also another important cause of many NGO project failures (Geoffrey 2011, 1–101).

The BOP Business Model—The Need for Safe Drinking Water as a Market Opportunity

During the 6th World Water Forum in Marseille, March 11th–17th 2012, three companies that are exploring the market potential by solving the demanding rural drinking water challenges through various innovative business and technological models were interviewed. They are all large multinational companies: Schneider Electricity, Shikoku Chemicals, and Grundfos. Their projects target the poor people in remote rural villages who cannot afford to pay for connection to a conventional centralized water supply system. Water supplies are usually community-based. Following are brief introductions to the business models of the three companies:

Schneider—Schneider started and self-funded their BipBop Program to bring rural people electricity. Access to water was just included in the program in 2007, because it was found that water and energy are very often closely interrelated; people are sometimes either paying a lot for electricity use to pump underground water or fetching unsafe drinking water from other resources. An innovative solar-powered pumping system will enable local villagers to have access to safe drinking water without dependence on grid electricity. Currently, revenues are mainly from product sales, just enough to cover costs, but the company expects to create more social and economic value by scaling up this business model in other regions of Africa and Asia in the future.

Grundfos—Grundfos is one of the world's largest pump manufacturers. The safe drinking water program was conducted as a CSR activity in Kenya, and included 38 projects serving 100,000 people with safe drinking water by solar-powered pump. Safe drinking water is sold at the pumping stations. The company runs the full package of the project all by themselves, including the pump manufacture, project design, mobilization of the community to adopt their system, technical training, maintenance, and so on. Initial funding was primarily from donations by Grundfos worldwide

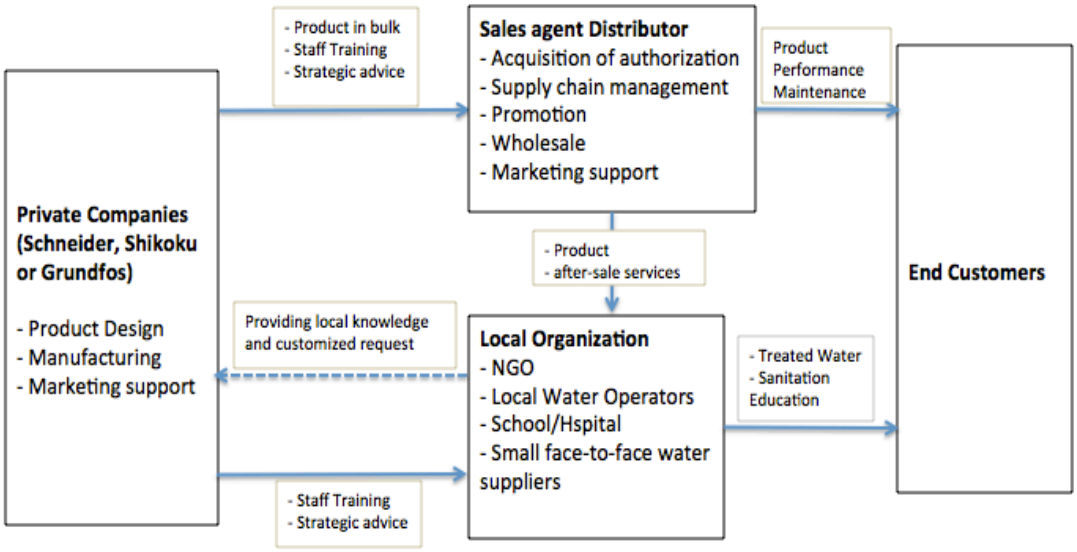
employees. The project shows that the water revenue can cover the maintenance cost, but an assessment of the population's willingness and capacity to pay should be conducted before implementing the project. The payback period is expected to be around five years for such projects.

One unique innovation from the company is their water tariff payment method. Villagers will be charged by the quantity of drinking water they collected at the water supply points and pay the water tariff by their cell phone.

SHIKOKU—Shikoku Chemicals Corporation is a giant chemical company, established in 1947 and based in Japan. The projects conducted by the company were supported by the Japanese governmental agency, the Japan International Cooperation Agency (JICA). The company developed a wide range of chemical products that purify water and has been supporting Indian NGOs who are actively involved in and experienced at supporting community efforts to improve the quality of life for children and women. The main activity of Shikoku Chemicals Corporation has been to help provide customized safe drinking water treatment and sanitation methods. Currently, it is actively conducting a feasibility study of its BOP business model for application in several other developing regions.

Although the technologies and business models employed by these three companies vary in their specifics, they operate within the general BOP business model (Figure 2).

Figure 2. BOP Business Model in Rural Drinking Water Supply Sector



Source: Created from Caterina Fonseca's data in "Briefing Note 1a - Life-cycle cost approach."

In addition, the challenges they face are very similar. A study from the World Health Organization summarizes these challenges: the three biggest barriers to investment flows to the low-income community drinking water areas are attributed to the problems of "Market Creation," "Distribution," and the "Financing Model" (Allen, James, and Francisco 2009).

Market Creation

All of the three companies mentioned the difficulties in and importance of understanding the local need for safe drinking water and its implications for customized technologies and business solutions. Learning of the actual situations—water resources, climate pattern, consumer preferences for the tastes, convenience, and prices—is time-consuming and requires engagement with local communities. Product designs that cannot fit the local circumstances will very likely fail.

On the other hand, the company needs also to create a market by raising local villagers' awareness of the link between health and safe drinking water. There are some cases in which NGOs and businesses can cooperate to create a hybrid organization—by focusing on the society's welfare and making a profit (Allen, James, and Francisco 2009). However, finding the right NGO to partner with is not always easy. NGOs usually operate at a slower pace than private companies, and the mutual trust needed between NGOs and the private sector is usually missing, according to the interview with Schneider and Grundfos.

Distribution

Due to the undeveloped basic infrastructures, setting up a reliable distribution channel remains a big challenge for Schneider and SHIKOKU, whose businesses generate revenue through selling equipment and chemicals. Additionally, business development people need to go to the sites in different villages to talk with local people repeatedly to sell the product or to finalize a project.

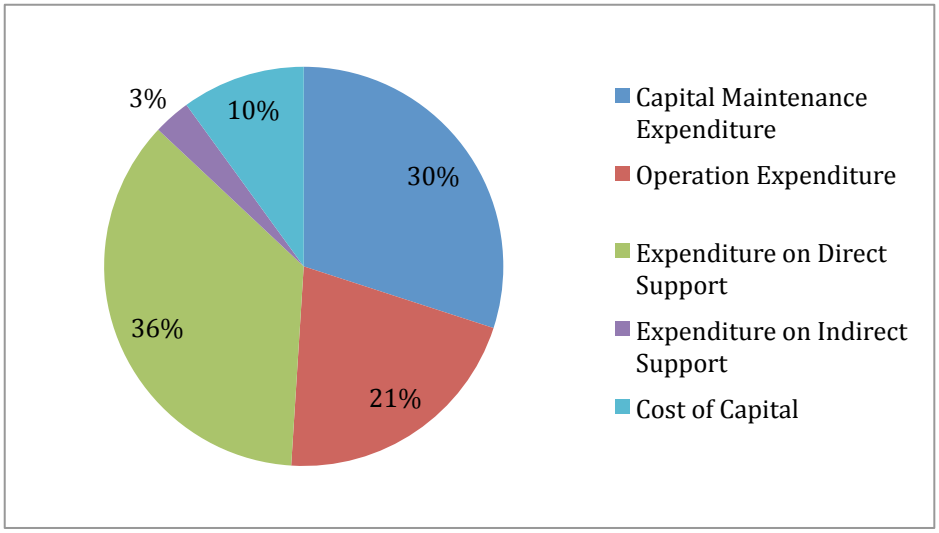
Financing Model

The financing model is very similar among the three companies. Parent companies cover the upfront investment in the technology and project development. Cost can be almost covered by sales and tariffs for Grundfos and Schneider. However, the human capital cost of the project conducted by Grundfos was covered by in-kind contributions from their employees. Staff-hours were therefore not included in the project analysis. According to the project manager, the full cycle of the rural water supply project requires a lot of staff-

hours and expertise from various backgrounds. The human resource costs to keep the project running would be a huge barrier for such projects to scale up in other developing countries.

The cost of keeping rural drinking water projects functioning permanently is summarized by a life-cycle approach conducted by WASHcost project (Fonseca et al. 2011). Their findings illustrate the challenges faced by Grundfos (Figure 3).

Figure 3. Cost Structure of a Water Supply Project



Source: The author.

The cost of direct support, which accounts for 36% of the total cost, was rarely included in the rural water and sanitation estimates. It includes the cost of ensuring that local governments have the capacity to plan and implement the project, manage contracts, and respond in the case of system breakdown. The cost of monitoring a private or public service provider's performance is also included in this category. The expenditures made on maintenance and operations account for more than 50% of the total cost. Most rural water projects are difficult to sustain because local communities cannot afford this portion of the cost by themselves. According to the study conducted by WASHcost, when the coverage rate of safe drinking water reached 40%–80%, it is the maintenance and

operations costs that cause the project failures (Fonseca et al. 2011). Therefore, for companies and small operators to run drinking water businesses in rural areas, both upfront investments and operation/replacement costs are important factors to consider.

According to the interview with Schneider, it is very difficult for companies selling equipment and products to persuade the local villagers or operators to make the large initial investment, especially in regions where the cost of financing is high and local villagers have very limited sources of financing.

In summary, the BOP business model has important advantages over the conventional water supply projects in terms of project performance:

a. One common advantage is their advanced technologies. The big international companies can provide tailored solutions and advanced technologies that meet the customized demands and solve the problems and challenges that the NGOs and local governments have been facing for years. One example would be the innovative water tariff payment method developed by Grundfos.

b. The projects are more sustainable. All three companies expressed their concern that if the projects failed in providing high-standard water services it would affect their reputations. Since the companies charge the local communities and put their company name on the water supply equipment, the public and local governments will scrutinize them; therefore, they are more motivated to maintain the water quality and services.

Other advantages include creating job opportunities, enhancing investment and operational efficiencies, and speeding up the provision of safe drinking water in rural areas.

Feasibility Study in China

In order to evaluate the feasibility of the BOP business model in China's rural water market and the opportunity to tap that huge market, several key variables (including GDP, etc.) of selected provinces in China were compared with those of the countries where the

BOP business case studies discussed previously took place (Senegal and Kenya) (Figure 4).

Figure 4. A Summary of Key Variables Comparison

Variables	Kenya	Senegal	Sichuan	Shaanxi	Guangxi	Yunnan
GDP per capita ($ US)	$760[2009]	$1,090[2010]	$4,227[2011]	$5,269[2011]	$4,038[2011]	$3,029[2010]
GDP annual growth rate (%)	2.6[2009]	1.4[2010]	15	13.9	12.3	12.3
Dealing with Construction Permits (Ranking)	37[2012]	125	179	179	179	179
Starting a business (Ranking)	132[2012]	93	151/19[a]	151/25	151/28	151/23
Total population (millions)	39.8	12.4	80.4	37.3	46.1	45.96
Percentage rural (%)	78	57.1	59.82	52.7	58.2	64.8
Literacy rate (% population over age 15)	87	49.7	94.56	96.26	97.29	93.97
Average household size (# person)	4.6	9	4	3.8	4.2	3.53
Water usage per capita (m^3)	605	202	80.55	223	660	328
% of rural population with access to improved water	52	52	64[11]	53[2005]	57.1	58
% of urban population with access to improved water	83.82	91.4	92	92	88	88

Sources of data: (Guangxi Bureau of Statistics 2012; Rural Poverty Portal 2011; Shaanxi Bureau of Statistics 2012; World Bank 2012; World Bank 2011; World Bank 2010; Yunnan Bureau of Statistics 2012).

a. The number 151 is the rank of China and the following number is the rank of the province within China.

Economic Background

The four provinces in China have a relatively stronger economy than Kenya and Senegal. There is a huge water technology market based on the amount of investment in China's rural water sector during the five-year period of 2006–2010, which was about $16 billion.

The investment in the rural water sector will only increase during the next five years according to the 12th Five-Year Plan.

At the same time, the exchange rate of the Chinese Yuan to the US dollar has decreased from 8.3 to 6.3 during the past two years, which is favored by business exporting to China. Water giants Veolia Water and Suez Environment have already invested aggressively in China's urban water systems, anticipating the fast economic growth and urbanization process in China.

According to a World Health Organization (WHO) estimate, a household should spend 3.5% of its income for its basic water supply (Johnsona et al. 2007, 416–427). Based on the past experiences, rural villagers have a much lower level of water demand (Johnsona et al. 2007, 416–427). It might thus be difficult for business and water operators to profit in most of the towns and villages. Nevertheless, user financing for rural water projects has been in place for many years, and the strong economy indicates a higher financial capacity to pay for safe drinking water from both customers (Figure 5) and the government (Johnsona et al. 2007, 416–427).

Figure 5. Summary of the Annual Rural Income per capita in Four Provinces of China

Province	Sichuan	Shaanxi	Guangxi	Yunnan
Rural income per capita ($)	$972.7	$798	$830	$627

Source: The author.

Water Demand from Rural Residents

The percentage of rural people with access to improved water resources in the four provinces is as low as it is in Kenya and Senegal. The main challenge to improving water supplies in most cases comes from water resource contamination (China Water 2011, 1–83; Lien Aid 2012). Research shows that most villages' underground water supplies in Beijing rural areas were exploited until 2011 and, as a result, 97% of the surface water across those villages has been contaminated (Junling et al. 2009). Most of the current rural centralized water supply systems don't even have a basic water treatment capacity. Among the 3.6 million rural residents in JinHua city of ZheJiang province, one million residents are still drinking water from contaminated springs and other water sources (Junling et al. 2009). In order to meet this water quality challenge, investment in and implementation of advanced designs, monitoring systems, and affordable water

purification technologies are required. In addition, a generally higher literacy rate indicates a higher awareness of hygiene and sanitation. Local people might be more willing to pay for safe drinking water and be more comfortable with new technology, as their literacy rate has increased.

Government

The government has put rural water safety as a high priority and has spent billions of dollars in building the water supply infrastructure and other basic infrastructures, but the rate of access to tap water is still low. Evidence shows that the investment is not very efficient, with some water supply systems exceeding the water demand. The main reason for this inefficiency is the strategy implemented by the central government. The central government granted funds, specified project requirements, and even material selection guidelines for the provincial and local governments, who will eventually implement the projects. As a result, the options available to solve the local water problems became very inflexible and such projects may not fit the local circumstances very well.

The government has encouraged and helped local businesses to step into the rural water supply market. Local government and people are generally continuing to welcome the investment from private and international investors. However, China ranks 151st and 179th out of 183 countries in "starting a business" and "dealing with construction permits," respectively. The time, procedures, and costs associated with starting a business and dealing with construction permits are generally much higher in China than in Kenya and Senegal according to the study from World Bank. In addition, the business will face similar risks from government regulations on water tariffs, importing technology, and so on. And the enforcement of intellectual property protection is still particularly difficult in China, which poses another risk for foreign companies doing business here.

The Operational Environment and Competition

Establishing a strategic partnership with the local governments, communities, and NGOs is a critical success factor for Grundfos in Kenya and Naandi Foundation in India. However, local NGOs and social enterprises are not well established in China. As a result, operations in China might not be able to receive support from local communities and NGOs. At the same time, thanks to the government's significant investments in the rural water sector in China, many domestic water purification and pumping technology suppliers have emerged in recent years. Compared to foreign investors, they have the advantages of offering a lower manufacturing cost and a closer connection to the local government and households. However, the BOP business model from international

companies is more technically capable of providing integrated and customized solutions, rather than just technologies.

Conclusion and Recommendation for Future Research

This article introduces the idea of using the BOP business model in the rural drinking water sector and discusses the opportunities and challenges of applying it in China. With strong government support, fast economic growth, and the pressure of increasing ecological problems, there will be a huge market for such bottom-up solutions to rural drinking water issues. A comparison of the China rural market with those in Kenya and Senegal reveals the challenges and barriers, which include government intervention, lack of financing sources, and understanding the local needs.

Due to the constraints of time and resources, this article covered only three types of companies and technologies. Other technologies, such as for water purification, water storage, and rainwater collection, are already rolling-out in the market. A more comprehensive study on successful cases of these technologies and businesses should be conducted to understand the available options.

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References

Allen, H., K. James, and N. Francisco. 2009. "The Need for Safe Water as a Market Opportunity." Innovations.

China Water. 2011. 中国"十一五"计划农村饮用水情况. Beijing: China Water.

Fonseca, C., et al. 2011. “Briefing Note 1a Life-cycle costs approach. IRC International Water and Sanitation Centre.” Available from http://www.washcost.info/page/1436

Geoffrey, M. 2011. A Critique of Development through the Analysis of Potable Water Projects in Rural China: University of Washington.

Guangxi Bureau of Statistics. Accessed February 8, 2012. Available from http://www.gxtj.gov.cn/.

Johnsona, D., D. Hokanson, Q. Zhang, K. Czupinski, and J. Tang. 2007. "Feasibility of Water Purification Technology in Rural Areas of Developing Countries." *Journal of Environmental Management* 88, no. 2008 (2007): 416-427.

Junling, Wang, Z. Yajun, H. Wei, W. Huizhen, and L. Junqi. 2009. Water Supply Situation and Suggestion on Rural Area of Beijing. Beijing: Beijing University of Civil Engineering and Architecture.

Lien Aid. "Projects in China." Accessed March 5, 2012.

Lin, F. and W. Zheng. 2009. "Performance of Rural Water Facilities' Market Supply: An Example from Shandong Province." *Reform* 187, no. 187 (2009): 81–86.

Rural Poverty Portal. Accessed March 2, 2012. Available from http://www.ruralpovertyportal.org/web/guest/country/statistics/tags/kenya.

Shaanxi Bureau of Statistics. Accessed February 3, 2012. Available from http://www.sn.stats.gov.cn/news/tjsj/201222165319.htm.

Wenguo, W., Z. Qili, Z. Xiang, and Yun, Z., Qichun, Hu. 2012. "四川省农村饮水安全现状与环境治理对策." 中国农村水利水电 no. 1: 109–115.

World Bank. Accessed March 23, 2012. Available from http://devdata.worldbank.org/AAG/ken_aag.pdf.

———. Accessed March 23, 2012. Available from http://www.ruralpovertyportal.org/web/guest/country/statistics/tags/senegal.

———. Accessed February 10, 2012. Available from http://www.doingbusiness.org/Rankings.

Yunnan Bureau of Statistics. Accessed March 8, 2012. Available from http://www.stats.yn.gov.cn/TJJMH_Model/newsview.aspx?id=1598376.

Biography

Zhan Zhou is a second-year master student of Environment Studies at the University of Pennsylvania, with a concentration in environmental policy. He has keen interests in business sustainability and clean technology development, and has been focusing his research primarily on opportunities for using private investment and market-based solutions to improve environmental performance. As the main objective of his master capstone, he is helping establish the first U.S. industry-wide vinyl flooring recycling program by exploring opportunities from industrial ecology and utilizing technology such as ArcGIS. Throughout his graduate studies at Penn, he was very fortunate to participate in various clean-tech and social impact projects, including DOE Electric Vehicle Public Charging Business Plan competition and organizing Wharton Social Impact Conference and utility-scale solar project evaluation for GreenWorld Capital. Before coming to the U.S., Zhan graduated from Nanyang Technological University in Singapore with BEng (Honors) in Materials Engineering. During his undergraduate studies, he spent six months in France doing research on nano-material synthesis for 3rd Generation solar cell and his final year doing research on CIGS thin-film solar cell.

Investing in Dynamic Green Portfolios

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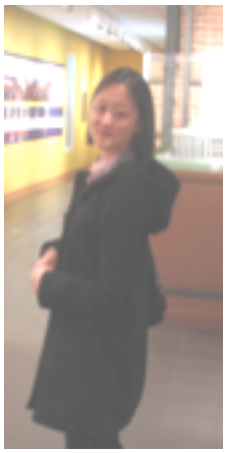

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Abstract

Investing in Dynamic Green Portfolios

In this paper, we initially define two types of stocks, green and non-green, in terms of their Kinder, Lydenberg, Domini Research & Analytics (KLD) environmental ratings. We then assemble a dynamic green portfolio with green stocks and a dynamic non-green portfolio with non-green stocks. The portfolios are dynamic in that they are rebalanced annually. By comparing the performance of the green portfolio to that of the non-green portfolio, we find that the green portfolio overwhelmingly outperformed the non-green portfolio over a medium or long term (for example, a five-year term), especially when the two portfolios are mean-variance optimal. We also prove that the better risk-adjusted performance of the green portfolio is robust to various portfolio-assembling techniques. We thus conclude that a company's financial performance is positively correlated to its involvement in environment-friendly activities. In other words, our findings support green investing.

Investing in Dynamic Green Portfolios

In recent years, as people have become more environmentally conscious, green investing has received considerable attention from private investors, mutual funds, and researchers. For example, in an article discussing "Why 'Green' Investing Has Gained Focus" by Jilian Mincer (WSJ 2007), Holly Isdale, once the managing director at Lehman Brothers, trumpets that "green investing is an investment opportunity, 'there is money to be made, and people want to know how to make it.'" Some researchers at Citigroup Inc. and UBS AG argue that global warming can no longer be ignored as a factor in investing. Mincer found that socially responsible mutual-fund firms, such as Calvert, had placed more and more green funds onboard. Investors, especially environment-conscious investors, have increased their portfolio holdings of green assets, such as stocks. Karnani (2010), however, contends that it is fundamentally flawed reasoning to think that companies have a responsibility to act in the public interest and will profit from doing so. He also argues that oftentimes companies will lose profits if they pursue their social responsibilities; therefore, only in some situations can companies do well by doing good (Karnani 2010).

Green investing can be defined as choosing investments in companies that have a positive environmental record. Green investing is also a special category of social investing. Green mutual funds, for instance, pertain to the larger category of socially responsible investment (SRI) mutual funds. Since the 1970s, environmental issues have increasingly caused concern throughout the world. Green investing, consequently, has long been in the lead in the SRI market and will likely continue to be so in the future (Little 2008; Uldrich 2008).

Investors' behavior immediately influences stock prices, and their preferences, therefore, could be the force that drives a company to go green. The motivation for investors to buy green stocks is not limited to profitability. Heinkel, Kraus, and Zechner (2001), for instance, hold that exclusionary ethical investing leads to polluting firms being held by fewer investors since green investors eschew the stock of polluting firms, thus leading to lower stock prices and a higher cost of capital for the polluting firms. If so, investing in green stocks must be a preferred strategy for all security investors (not just environment-conscious investors). The research we have undertaken is aimed at proving this point.

Related Literature

Since the 1980s, quite a few papers have examined the difference in performance between green mutual funds and non-green mutual funds, between green portfolios and non-green portfolios, and between green stocks and non-green stocks. The findings can be summarized as: 1) green investing outperforms non-green investing; 2) the difference in performance between green investing and non-green investing is not significant; and 3) subject to abnormal negative returns, green investing underperforms non-green investing.

A vast amount of literature documents that green and/or socially responsible stocks outperform alternative stocks. In particular, Herremans, Akathaporn, and McInnes (1993) examine firms in different industries and insist that only stocks of clean firms in industries having social conflict (including conflicts with the community and the environment) have higher returns but lower stock market risk. White (1995) and Cohen, Fenn, and Konar (1997) find that green firms have positive abnormal stock returns while brown firms do not. Heal (2005) trumpets that firms with higher environmental ranks perform better financially than their low-rated peers. Hart and Ahuja (1996) find that the two or three years following firms' emission reductions are associated with higher returns on equity, but they fail to prove that the association is causality. Dowell, Hart, and Yeung (2000) find a positive correlation between stock market performance and environmental standards as measured by Tobin's q (the ratio of the market value of a company to the replacement costs of its assets). King and Lenox (2001) examine a different and larger sample of firms and their findings are consistent with those of Dowell, Hart, and Yeung (2000). Plantinga and Scholtens (2001) used style analysis to assess fund performance in Belgium, France, and the Netherlands for over 800 investment funds during the 1990s. They contend that funds that to some extent mirror well-known social responsibility indices tend to perform better than funds that have no relationship with socially responsible investment strategies. Bello (2005) and Rudd (1981) have done several empirical studies to testify whether socially responsible stocks outperform alternative stocks.

Many investigations show no significant difference in relative performance between green stocks (funds) and non-green stocks (funds). Cai and Branch (2012) argue that the exclusion of socially irresponsible stocks from an index-tracking portfolio has little influence on the efficiency of the portfolio in delivering market performance; for example, Hamilton et al. (1993) examine the monthly performance of U.S. equity mutual funds and find no difference between the performance of conventional and green funds. Diltz (1995)

investigates the daily returns of 14 portfolios formed by ethical screens over three years and finds abnormal positive returns in only 3 portfolios (Heinkel, Kraus, and Zechner 2001). Renneboog, ter Horst, and Zhang (2007) claim that the risk-adjusted returns of SRI funds in the United States and the United Kingdom are not significantly different from those of conventional funds.

Previous empirical work also demonstrates that green funds may have negative abnormal performance. White (1995), for instance, examines the performances of six U.S. and five German green mutual funds from 1990 to 1993. He finds negative abnormal returns for most of the green funds. Geczy, Stambaugh, and Levin (2005) argue that SRI funds must always underperform funds that are not constrained by ethical considerations. The ground is that a fund manager cannot improve his performance or even worsen it if the universe from which stocks can be picked is restricted. Renneboog, ter Horst, and Zhang (2007) reveal that while corporate social responsibility (CSR) may create value for shareholders, participating in other social and ethical issues is likely to destroy shareholder value.

Other research on SRI include the following: 1) Hallerbach et al. (2004), who introduce a framework for managing an investment portfolio in which the investment opportunities are described in terms of a set of attributes. Part of this set is intended to capture the effects on society. 2) Mackey, Mackey, and Barney (2002) propose a theoretical model in which the supply and demand for SRI opportunities determines whether these activities will improve, reduce, or have no impact on a firm's market value. The theory shows that a publicly traded firm's socially responsible activities will maximize the market value of their firm even if such activities do not maximize the present value of the firm's future cash flows. 3) Renneboog, ter Horst, and Zhang (2007) argue that even though SRI funds underperform conventional funds in profitability, the volatility of money-flows is lower in SRI funds than in conventional funds, and SRI investors' decisions to invest in an SRI fund are less affected by management fees than the decisions by conventional fund investors.

This work complements a vast literature on green investing and SRI. Unlike Little (2008), who excludes environment-unfriendly stocks, we investigate all stocks carried in the KLD database, which will be detailed in the data section. We select stocks by some predefined environmental criteria. Different from those in the current literature, the screening criteria in this work are based upon companies' KLD environmental ratings as they are reflected in a number of environmental strengths. Companies with the largest number of

environmental strengths are perceived as the greenest. Without loss of generality, we simply define two types of stocks—green and non-green. Green stocks constitute the green portfolio and non-green stocks constitute the non-green portfolio. Both portfolios are rebalanced annually, so they are actively managed and the stocks in each of the two portfolios vary over time. In lieu of examining a short time horizon, we observe the performance of stocks during the period from 1994 through 2010 to enhance our results. In addition, our research is based on rolling periods, thus making our work robust to biases in selecting time horizons.

The majority of works in the current literature are based on short-term performance of stocks, mutual funds, and ETFs. Hart and Ahuja (1996), however, find that firms' emission reductions are associated with higher returns on equity two or three years after the reductions take place. In accordance with Hart and Ahuja (1996), we believe that the performance of stocks should be examined in a medium- or long-term range since it takes time for an investor to become acquainted with a company and its stock. Our findings show that the performance of green investing should be investigated over a relatively longer run, that is, three to five years. In this research, we set the span of each rolling window to be five years. Several methods have been used in previous empirical studies to measure performance, such as return, Tobin's q, firm's market value, present value of the firm's future cash flows, and volatility of money-flows, and so on. However, we compare the expected return and Sharpe ratio between the green portfolio and the non-green portfolio.

Heal (2005) studies only the firms with different environmental ranks in the same sector, while we examine cross-industry firms at different level of greenness. Herremans, Akathaporn, and McInnes examine firms in different industries and insist that only stocks of clean firms in industries having social conflict have higher returns but lower stock market risk. Rather than study only industries having social conflict (Herremans, Akathaporn, and McInnes), we investigate all industries but concentrate on environmental issues only. In addition, we examine stocks within the environment of a (dynamic) portfolio rather than on an individual basis, as is done in most of the above works.

The remainder of the paper is organized as follows: we describe the data and define two types of portfolios—green and non-green; in the next section, methodologies are introduced; then the performance and risk characteristics of the green portfolio is compared to that of the non-green portfolio; and in the last section, present the conclusions.

Data Description

The main data sources of this research are the KLD Social Ratings data, CRSP data, and Fama-French data. The KLD Social Rating, published by Kinder, Lydenberg, Domini Research & Analytics, is a very influential measure of corporate social performance. KLD data cover approximately 80 qualitative indicators in seven major social issue domains: community, corporate governance, diversity, employee relations, environment, human rights, and product. Each indicator is assigned with a dummy value "1" or "0." In particular, "1" represents presence and "0" represents the absence. The domain of environment encompasses seven strength indicators (beneficial products and services, pollution prevention, recycling, clean energy, communications, property, plant, and equipment (PPE), and other strengths). Same as above, the dummy value "1" indicates the presence and "0" indicates the absence of an environment strength indicator. In this work, the time horizon of environmental ratings in the KLD dataset is from 1991 through 2010, over which the number of stocks carried in the KLD dataset has been increasing. Currently, the KLD database carries more than 3,100 stocks from a rich index universe: S&P500 Index, Domini 400 Social Index, Russell 1000 Index, Large Cap Social Index, Russell 2000 Index, and Broad market Social Index. The KLD data is published once a year, thus the same rating is valid throughout the year.

In the KLD, the total number of environmental strengths is the summation of the (dummy) values assigned to the seven strength indicators. We use the total number of environmental strengths to filter stocks and fit them into corresponding portfolios. In particular, a green stock is defined as having at least one environmental strength; a non-green stock is defined as having no environmental strengths. The definitions (or screening criteria) for green and non-green stocks are summarized in Figure 1: A stock is perceived as green if it enjoys at least one environmental strength, and as non-green if it has none. In particular, a green stock is defined as $N_{str} \geq 1$, while a non-green stock is defined as: $N_{str} = 0$. N_{str} denotes the number of environment strengths.

Figure 1: Definition of Green and Non-green Stocks (Companies)

Type	Green	Non-green
N_{str}	≥ 1	0

Source: The authors.

We observe the environmental ratings for a stock for three years in a row before allocating the stock to a portfolio. Only the stocks that are characterized as green or non-green throughout the three-year screening period will be selected to form the green or non-green portfolio. The performance of the green and non-green portfolios will be examined for the

following five years. In other words, we design a three-year window for screening stocks and a five-year window for examining the performance of the two selected stock portfolios. The three-year screening window, starting from 1991, rolls annually. If we start observing stock ratings from 1991, for instance, only stocks that are categorized as green in 1991, 1992, and 1993 will be selected to build the green portfolio, and the performance of that portfolio will be examined in the following five years: 1994, 1995, 1996, 1997, and 1998. Next, the three-year screening window rolls one year forward and we select stocks labeled as green in 1992, 1993, and 1994 to assemble the green portfolio. The performance of the portfolio is examined in the following five years: 1995, 1996, 1997, 1998, and 1999, and so on. The number of stocks in the green portfolio and its counterparty are illustrated in each screening and performance window in Figure 2. The screening column contains three-year rolling periods for selecting stocks. The performance column contains five-year rolling periods over which the performance of the selected stocks is examined. N_{stk} represents the number of stocks. The green and non-green columns represent the green portfolio and the non-green portfolio, respectively. The number of stocks in both portfolios is larger than 30 in any period, implying that the two portfolios are well diversified. Note that we have eliminated the stocks that are missing environmental ratings in the screening window or missing return data in the performance window.

Figure 2: Stocks in the Green (Non-green) Portfolio over Rolling Periods

Window		N_{stk}	
Screening	**Performance**	**Green**	**Non-green**
1991–1993	1994–1998	78	44
1992–1994	1995–1999	76	51
1993–1995	1996–2000	71	43
1994–1996	1997–2001	75	36
1995–1997	1998–2002	79	32
1996–1998	1999–2003	84	37
1997–1999	2000–2004	85	37
1998–2000	2001–2005	75	37
1999–2001	2002–2006	74	42
2000–2002	2003–2007	72	46
2001–2003	2004–2008	73	58
2002–2004	2005–2009	70	67
2003–2005	2006–2010	69	92

Source: The authors.

Another major data source is CRSP (the Center for Research in Security Prices), which has been an integral part of the academic and commercial world of financial and economic research (see the CRSP Programmer's Guide at http://www.crsp.com/). We retrieve the data of returns and stock IDs ("PERMNO") from CRSP for all the stocks satisfying the screening criteria. PERMNO is a unique permanent security identification number assigned by CRSP to each security. We use PERMNO rather than CUSIP, Ticker, or company name to identify a stock because only PERMNO does not change during an issue's trading history or even if the issue ceases trading. PERMNOs and stock returns can be found in CRSP and the environmental ratings in KLD, thus incentivizing us to merge CRSP and KLD into a larger dataset so that the data of stock returns, PERMNOs, and KLD environmental ratings are together. CRSP contains both monthly and daily data. To compare the performance and risk characteristics between the green portfolio and its counterparty, we examine daily returns in lieu of monthly returns. The reason is that in the stock market, daily returns give us a richer picture of the market than monthly returns do. KLD starts issuing environmental ratings from 1991, and since three successive years of ratings are required for the screening purpose (1991, 1992, and 1993), the CSRP stock return data needed for examining performance in this research is no earlier than Jan 1994.

In addition to information from KLD and CRSP, the data of the daily risk-free rate is also indispensible to our analysis. We use 17 years, from 1994 to 2010, of daily risk-free rates (this data is available from Professor Kenneth French's website, http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/). We incorporate risk-free rates into CRSP in order to calculate the excess return (R_P - R_f) as well as the Sharpe ratio (the Sharpe ratio is developed by Nobel laureate William F. Sharpe to measure risk-adjusted performance. The Sharpe ratio can be expressed as: S = R - Rf / s. That is, the Sharpe ratio is the expected excess return divided by the standard deviation of the excess return).

Methodology

We construct two portfolios, green and non-green, in each period for paired comparison analysis. We build up the green and non-green portfolio only with stocks that are defined as green or non-green throughout the three-year screening period and that are missing no return data in the following five-year performance period. A stock is categorized as green or non-green in terms of its total number of environmental strengths assigned by KLD. As previously discussed, a green stock is defined as "$N_{str} \geq 1$" and a non-green stock is defined as "$N_{str} = 0$". KLD publishes social ratings for each company on an annual basis. Both portfolios, therefore, have to be rebalanced annually based on the updated three-year KLD ratings as the screening window rolls. Only the performance of stocks consistently pertaining to a specific type, green or non-green, during the screening period will be

examined within the framework of their portfolios in the following five-year performance period. As the three-year screening window rolls, one year of new ratings are incorporated and one year of the oldest ratings are dropped.

Portfolio rebalancing refers to updates on both the assets (stocks) and the weight of each asset in a portfolio. In this work, the probability for a stock to be selected depends on whether the stock meets the screening criteria and possesses complete return data in the performance period. The weight of each stock is measured in two ways: equal weight and optimal weight. Equal weight indicates that each stock accounts for the same proportion in the portfolio. Optimal weight implies that the weight of each stock in a portfolio has been optimized via Mean-Variance Optimization (MVO).

Modern Portfolio Theory

The MVO approach, which has been well recognized in finance, was first introduced by Harry Markowitz in his Modern Portfolio Theory (Markowitz, 1952). The concept of the equally weighted portfolio is accessible, so we elaborate on only the MVO methodology.

Assumptions:

1. Returns from the portfolio are normally distributed (multivariate normality is assumed).

2. Correlations between the stocks are fixed or constant for a period of time.

3. The investors seek to maximize their overall profit/economic utility.

4. All players in the market are rational and risk averse.

5. Common information is available to all players in the market.

6. All players are price takers.

Symbols:

wi: weight allocation to stock i in the portfolio.

ri: return of stock i in the portfolio.

RP: return of the portfolio.

σi: volatility of stock i in the portfolio.

ρij: correlation coefficient between stock i and stock j in the portfolio.

σtol: acceptable volatility of portfolio returns.

Rr: required or acceptable rate of return.

B: investment budget (i.e., *100%*).

The expected return of the portfolio:

$$ERP=i=1nwiE(ri)$$

The volatility of the portfolio:

$$\sigma P=i=1nj=1nwiwj\sigma i\sigma j\rho ij$$

Portfolio Optimization

The Modern Portfolio Theory comes up with an efficient way to build and optimize portfolios. The optimal portfolio can be achieved either by minimizing the portfolio volatility at a required rate of reward or by maximizing the portfolio reward while constraining the portfolio volatility. The constraint on volatility is generally reflected as risk tolerance. The problem of optimizing a portfolio can be solved by using quadratic programming. The mechanism behind the programming is as follows:

Model 1:

Objective Function: Minimize σP

Subject to the following constraints:

Constraint 1 (returns constraint): $ERP=i=1nwiE(ri)\geq Rr$

Constraint 2 (budget constraint): $i=1nwi\leq B$

Constraint 3 (allocation constraint): $wi \geq 0$

Model 2:

Objective Function: Maximize ERP

Subject to the following constraints:

Constraint 1 (volatility constraint): $\sigma P \leq \sigma tol$

Constraint 2 (budget constraint): $i=1nwi \leq B$

Constraint 3 (allocation constraint): $wi \geq 0$

Model 1 is to optimize a portfolio by minimizing portfolio volatility given a required rate of return. Model 2 is to optimize a portfolio by maximizing portfolio return while controlling portfolio volatility. Note that all weights are set to be positive in both cases, implying that short sales are not allowed. The constraint $wi \geq 0$ can be removed if short sales are allowed. A short sale is the sale of a security that is not owned by the seller but is promised to be delivered. Therefore, a short sale is a speculative strategy that might be manipulated by investors to profit from the falling price of a stock. Consequently, the Securities & Exchange Commission (SEC) allows investors to sell short only on an uptick or a zero-plus tick (with some exceptions, as explained in the SEC's alternative uptick rule). In other words, an investor cannot sell a stock short if it is already going down. Due to the limitation of short sales, we assume that short sales are not allowed.

Performance Comparisons

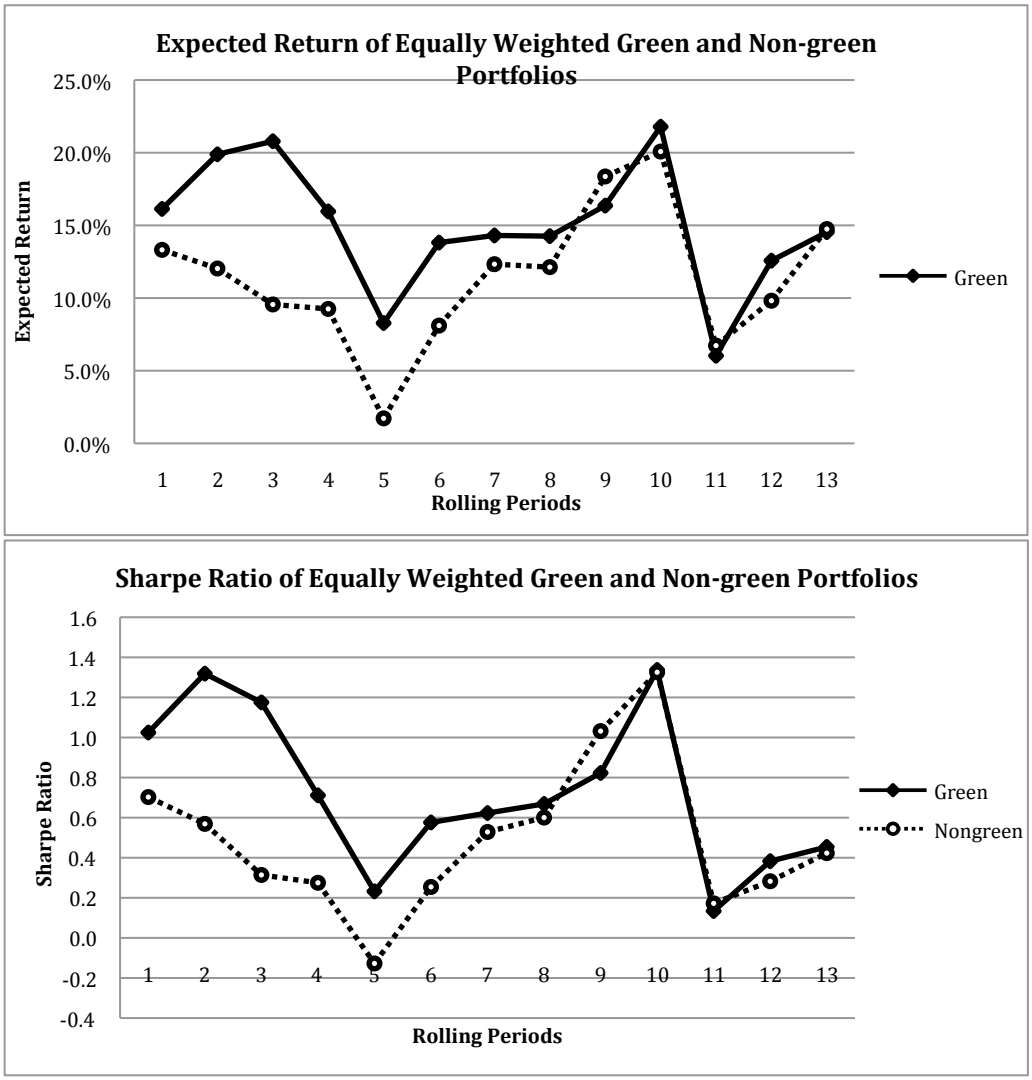
Various methods can be used to measure the financial performance of a portfolio. In this paper, we use expected return and Sharpe ratio as the performance measures. The expected return is the average of daily (portfolio) returns over a five-year performance period. Comparing performance by expected return might be misleading because a portfolio can reap higher returns than its peers by taking additional risk. We therefore introduce the Sharpe ratio into our analysis because it identifies whether a portfolio's higher returns are proceeds of wiser investment decisions or a result of assuming excess risk. In other words, the Sharpe ratio is a risk-adjusted performance measure. The greater a portfolio's Sharpe ratio, the better its risk-adjusted performance has been.

As Figure 2 illustrates, from 1994 to 2010, there exist 13 rolling five-year performance windows. The performance of a green portfolio and that of a non-green portfolio are compared in each of the 13 windows. Due to environmental screens, stocks in the two portfolios vary with the performance window. Portfolio returns can be calculated in different ways, depending on how the portfolio is built up. For an equally weighted portfolio, the portfolio returns are essentially the arithmetic mean of the returns of all stocks pertaining to the portfolio. For an optimal portfolio, the portfolio returns are the optimally weighted average of the returns of all stocks in the portfolio. The optimal weights can be achieved via mean-variance optimization.

Equally Weighted Portfolios

A portfolio is equally weighted if all the stocks in the portfolio have equal weights. By comparing the performance of the equally weighted green portfolio and the equally weighted non-green portfolio, we find that the green portfolio outperforms the non-green portfolio in all the other 11 rolling five-year performance periods except for the ninth and the eleventh periods, which are "2002–2006" and "2004–2008," respectively. From 2002 to 2006, the annualized average return of the green portfolio is 16.36% while that of the non-green portfolio is 18.36%. From 2004 to 2008, the annualized mean return of the green portfolio is 6.03%, which is only slightly lower than that of the non-green portfolio. A comparison of the Sharpe ratios between the two portfolios also brings us to the same conclusion: the green portfolio outperforms the non-green portfolio in all but periods 9 and 11. In particular, from 2002 to 2006, the Sharpe ratio of the green portfolio is .82, while that of the non-green portfolio is as high as 1.03; from 2004 to 2008, the Sharpe ratio of the green portfolio is .13, which is slightly lower than that (.17) of the non-green portfolio. An equally weighted portfolio is constructed by assigning even weight to all stocks in the portfolio (Figure 3). The rolling performance periods each have a span of five years and they roll over annually. Therefore, there exist 13 rolling performance periods from 1994 to 2010. Period "1" represents "1994–1998," for instance, period "2" represents "1995–1999," . . . and period "13" represents "2006–2010." Both expected return and Sharpe ratio have been annualized; that is, *annual return = 252 × daily return, and annual Sharpe ratio = 252 × daily Sharpe ratio*.

Figure 3: Comparing Performance of Equally-Weighted Green and Non-green Portfolios



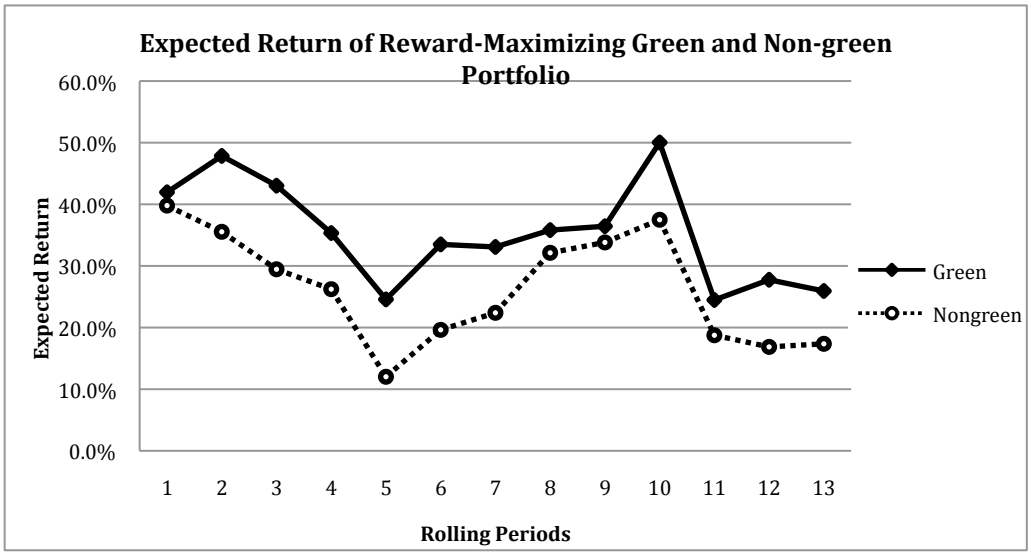
Source: The authors.

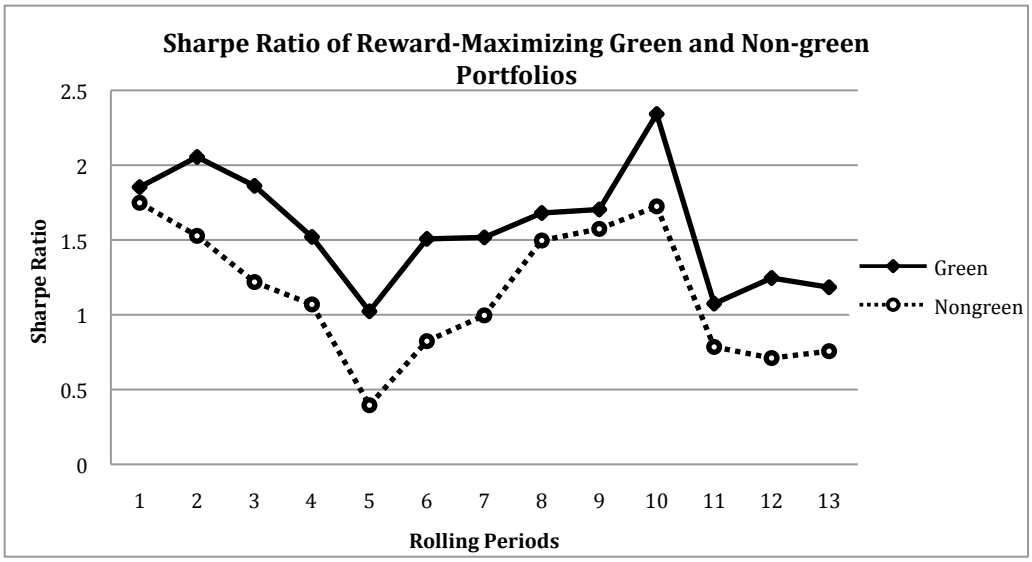
Reward-Maximizing Portfolios

A reward-maximizing portfolio is assembled by maximizing the expected portfolio return at a given volatility (or risk tolerance). In this research, we set the upper limit of the annualized volatility to be 20% for both the green portfolio and the non-green portfolio (The preset annualized volatility (20%) is a random positive number. We can draw the same conclusion by setting different numbers for the volatility due to the property of

comparative analysis). By comparing the performance of the reward-maximizing green portfolio with that of the reward-maximizing non-green portfolio, we find that the green portfolio distinctly performs better than the non-green portfolio in any of the 13 performance periods. The outperformance of the green portfolio over its counterparty, with respect to both expected return and Sharpe ratio, is remarkably significant over all the rolling performance periods (Figure 4). The rolling performance periods each have a span of five years and they roll over annually. Therefore, there exist 13 rolling performance periods from 1994 to 2010. Period "1" represents "1994–1998," for instance, period "2" represents "1995–1999," . . . and period "13" represents "2006–2010." Both expected return and Sharpe ratio have been annualized. i.e., *annual return = 252 × daily return*, and *annual Sharpe ratio = 252 × daily Sharpe ratio.*

Figure 4: Comparing Performance of Reward-Maximizing Green and Non-green Portfolios





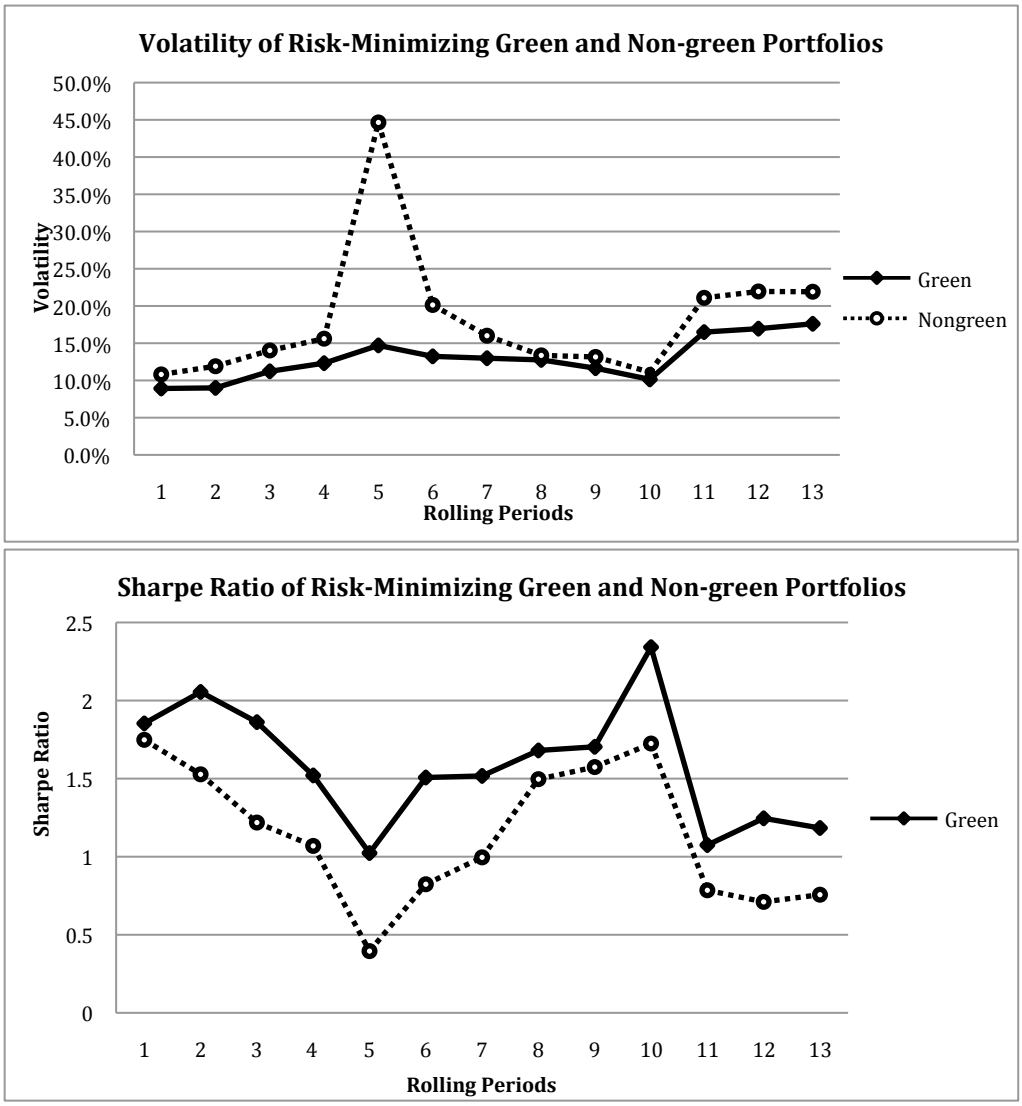
Source: the authors.

Risk-Minimizing Portfolios

A risk-minimizing portfolio is constructed by minimizing the risk the portfolio is subject to at a given required rate of return. For simplicity, we set the annualized required rate of return to be 20% for both the green portfolio and the non-green portfolio. (The preset annualized rate of return (20%) is also a random positive number. Refer to the previous section on reward-maximizing portfolios.) The rolling performance periods each have a span of five years and they roll over annually. Therefore, there exist 13 rolling performance periods from 1994 to 2010. Period "1" represents "1994–1998," for instance, period "2" represents "1995–1999,"…, and period "13" represents "2006–2010." Both volatility and Sharpe ratio have been annualized, i.e., *annual volatility = 252 × daily volatility* and *annual Sharpe ratio = 252 × Sharpe ratio.* By contrasting the performance of the risk-minimizing green portfolio with that of the risk-minimizing non-green portfolio, we find that the green portfolio significantly outperforms the non-green portfolio in respect to Sharpe ratio in any of the 13 five-year rolling performance periods. The two portfolios turn out to enjoy the same expected return, which is constant at 20% throughout the 13 performance periods, due to the settings for the optimization. Rather than compare the expected return, therefore, we compare the volatility of the returns of the two portfolios. The volatility of the non-green portfolio is remarkably higher than that of the green portfolio, especially during the fifth rolling period (1998–2002), implying that in order to achieve the same rate of reward, the non-green portfolio has to assume higher

total risk, which includes market risk and specific risk, than the green portfolio (Figure 5). In other words, the green portfolio outdoes the non-green portfolio and therefore is a better investment choice.

Figure 5: Comparing Performance of Risk-Minimizing Green and Non-green Portfolios



Source: The authors.

Conclusion and Future Work

The study compares the financial performance of two actively managed portfolios: a green portfolio and a non-green portfolio. The portfolios are actively managed because the portfolio manager refreshes the stocks and their loadings in each portfolio annually. We

came up with definitions and criteria for selecting stocks and assembling portfolios, that is, we selected only stocks pertaining to a category, green or non-green, for three successive years (a screening window). We then built a green portfolio with the selected green stocks and a non-green portfolio with the selected non-green stocks. After portfolios were formed, we next examined the performance of the two portfolios in the following five years. In following this technique, investment managers can actively manage portfolios by rebalancing them once a year, a frequency in correspondence with that of KLD releasing new social ratings. The rebalancing starts from 1994 because KLD starts issuing social ratings from 1991 and we need to observe the environmental ratings for a stock for three successive years (1991, 1992, and 1993) before it is selected. The rebalancing occurs each year after 1994 and ends in 2006. We have to reserve 5 years (2006–2010) of historical data for examining the performance of the portfolios after the last rebalancing. The two portfolios, therefore, are rebalanced for 13 times based on the historical data.

After contrasting the performance of the two portfolios in each of the 13 rolling performance periods, we conclude that the green portfolio overwhelmingly outperforms the non-green portfolio in terms of expected return and the Sharpe ratio. The Sharpe ratio adjusts for risk and is a risk-adjusted performance measure, as does the mean-variance optimization methodology. The green portfolio's outstanding performance, therefore, is robust to biases in selecting performance measures. We also unveil that the green portfolio is subject to lower risk than the non-green portfolio when their yields are parallel. The better performance of the green portfolio might be interpreted by the fact that investors are becoming increasingly environment-conscious, thus reinforcing their investment in green companies. Another possible reason is that going green helps a company to build up a good image, which attracts new customers. It is also possible that a green company may face more profitable investment opportunities, such as opportunities in solar power.

In sum, in a medium or long run, green stocks outperform non-green stocks. The difference in the stocks' financial performance may be explained by the difference in the companies' involvement in environment-friendly activities. Particularly, the more a company participates in environment-friendly activities, the more lucrative and stable its stock will be in the future.

Our findings are currently based upon five-year returns data, thus reflecting only the long-term benefits in green investing. In the future, returns for shorter terms, such as a two-year horizon, will also be examined to reveal a richer picture of the relations between a company's involvements in "green" activities and its future financial performance. In addition to expected returns and the Sharpe ratio, more performance measures will be

incorporated into our future research. We will double check the soundness of the screening criteria defined in this paper by selecting current stocks and checking their performance up until five years into the future. In addition to historical data, we are also considering simulating stock returns and using them to test the reasonableness of this green investing strategy, which may also be applied to forecasting the reward and risk in green investing.

References

Bello, Zakri Y. 2005. "Socially Responsible Investing and Portfolio Diversification." *Journal of Financial Research* 28(1): 41–57.

Branch, Ben S., and Li Cai. 2012. "Do Socially Responsible Index Investors Incur an Opportunity Cost?" *Financial Review* 47(3): 617–630.

Chatterji, Aaron K., David I. Levine, and Michael W. Toffel. 2009. "How Well Do Social Ratings Actually Measure Corporate Social Responsibility?" *Journal of Economics and Management Strategy* 18(1): 125–169.

Cohen, Mark A., Scott A. Fenn, and Shameek Konar. 1997. "Environmental and Financial Performance: Are They Related?" Working Paper. Nashvile, TN: Owen Graduate School of Management.

Diltz, J. David. 1995. "The Private Cost of Socially Responsible Investing." *Applied Financial Economics* 5(2): 69–77.

Dowell, Glen, Stuart Hart, and Bernard Yeung. 2000. "Do Corporate Global Environmental Standards Create or Destroy Market Value?" *Management Science* 46(8): 1059–1074.

Geczy, Christopher, Robert F. Stambaugh, and David Levin. 2005. "Investing in Socially Responsible Mutual Funds." Working Paper. Philadelphia: Wharton School of the University of Pennsylvania.

Hallerbach, Winfried, Haikun Ning, Aloy Soppe, and Jaap Spronk. 2004. "A Framework for Managing a Portfolio of Socially Responsible Investments." *European Journal of Operational Research* 153: 517–529.

Hamilton, Sally, Hoje Jo, and Meir Statman. 1993. "Doing Well While Doing Good? The Investment Performance of Socially Responsible Mutual Funds." *Financial Analysts Journal* 49(6): 62–66.

Hart, Stuart L., and Gautam Ahuja. 1996. "Does It Pay to Be Green? An Empirical Examination of the Relationship Between Emission Reduction and Firm Performance." *Business Stratem and the Environment* 5: 105–116.

Heal, Geoffrey. 2005. "Corporate Social Responsibility: An Economic and Financial Framework." *The Geneva Papers* 30: 387–409.

Heinkel, Robert, Alan Kraus, and Josef Zechner. 2001. "The Effect of Green Investment on Corporate Behavior." *Journal of Financial and Quantitative Analysis* 36(4): 431–449.

Herremans, Irene M., Parporn Akathaporn, and Morris McInnes. 1993. "An Investigation of Corporate Social Responsibility Reputation and Economic Performance." *Accounting, Organizations and Society* 18(7): 587–604.

Karnani, Aneel. 2012. "The Case Against Corporate Social Responsibility." *Wall Street Journal,* June 14. Available from http://online.wsj.com/article/SB10001424052748703338004575230112664504890.html

King, Andrew A., and Michael J. Lenox. 2001. "Does It Really Pay to Be Green? An Empirical Study of Firm Environmental and Financial Performance." *Journal of Industrial Ecology* 5(1): 105–116.

Little, Ken. *The Complete Idiot's Guide to Socially Responsible Investing*. 2008. Publisher: Marie Butler-Knight. New York: Alpha Books, Penguin Group.

Mackey, Alison, Tyson B. Mackey, and Jay B. Barney. 2002. "Corporate Social Responsibility and Firm Performance: Investor Preferences and Corporate Strategies." *Academy of Management Review* 32(3): 817–835.

Markowitz, Harry. 1952. "Portfolio Selection." *Journal of Finance* 7(1): 77–91.

Mincer Jilian. 2007. "Why 'Green' Investing Has Gained Focus." *Wall Street Journal,* June 21. Available from http://online.wsj.com/article/SB118239582814643063.html

Plantinga, Auke, and Bert Scholtens. 2001. "Socially Responsible Investing and Management Style of Mutual Funds in the Euronext Stock Markets." Working Paper. Groningen, the Netherlands: Department of Finance, University of Groningen.

Renneboog, Luc, Jenke ter Horst, and Chendi Zhang. 2007. "Socially Responsible Investments: Methodology, Risk Exposure and Performance." Working Paper. Tilburg, the Netherlands: Tilburg University.

Rudd, Andrew. 1981. "Social Responsibility and Portfolio Performance." *California Management Review* 23(1): 55–61.

Uldrich, Jack. 2008. *Green Investing*. Avon, MA: Adams Media.

White, Michael A. 1995. "Corporate Environmental Performance and Shareholder Value." Working Paper. Charlottesville, VA: University of Virginia.

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Building Ecological Entrepreneurship: Creating Environmental Solutions Based on the Cultural Realities and Needs of Local People

Fomba Emmanuel Mbebeb

Abstract

Building Ecological Entrepreneurship: Creating Environmental Solutions Based on the Cultural Realities and Needs of Local People

The endogenous economy (as compared to a linear paradigm of economic growth) has recently attracted interest in sustainable development debates due to its ecological friendliness. In this article, I examine the function of endogenous ecological entrepreneurial investments as a strategy that shifts from corporate-oriented capitalism and local survival strategies toward sustainable environmental management by local people. In order to investigate the subject, a questionnaire was administered to young people who worked on a green economy project in Cameroon, and a data analysis was conducted by employing quantitative and qualitative techniques. A positive attitude toward green ventures was observed in the participants and the survey confirmed that attitudes, social norms, and perceived behavior control were significant predictors of the participants' intention to engage in ecological entrepreneurship. Male and female participants did not show any significant difference regarding attitudes about green business and start-up intent. In fact, the critical role of green economy awareness and investment in green entrepreneurship was evident. Despite the optimistic look, however, qualitative analysis exposed difficulties in actualizing ecological entrepreneurship as a model of sustainable resource exploitation, economic growth, and climate change mitigation. Drawing on lessons derived from the community-based intervention project, I conclude the study with practical research directions for future policies.

Building Ecological Entrepreneurship: Creating Environmental Solutions Based on the Cultural Realities and Needs of Local People

Within the context of a green economy, the concept of ecological entrepreneurship has emerged as a way to mitigate market failures and promote social welfare through the exploitation of environmentally responsible opportunities (Meek, Pacheco, and York, 2010; Tandoh-Offin 2010). In the Majority World, the concept legitimately shifts from a dependence on corporate ventures to a focus on small-scale survival activities typical of rural entrepreneurship, in which local people invest mainly in natural resource development, such as agricultural exploitation. As traditional entrepreneurs, farmers engage in subsistence farming activities that affect the ecosystem. Farming is the natural capital upon which society depends, but it has not been adequately recognized, valued, or preserved by the people it serves, and is subject to serious climate risks (Hill et al. 2010; Petrin 1994). Although the motivation to undertake entrepreneurial action is moderated by social, cultural, and ecological norms, it is at times influenced by economic interests that are characterized by patterns of aggressive and unsustainable consumption. Recently, ecofriendly entrepreneurship has been perceived as an intervention strategy capable of accelerating the process of rural development (Petrin 1994; United Nations Organization 2011), and at the core of this action is the eco-entrepreneur. Thus, given the necessary drive, self-confidence, and capacity to manage their endogenous economic activities, local people promote investments in small-scale agro-enterprises.

Hill et al. (2010, 37) highlight the growing business viewpoint that "as pressure increases on the world's natural resources, concerns over environmental degradation have shifted from the fringes of altruistic concern to tangible global economic losses." On the local level, however, economic behaviors are expressed through small social or familial subsistence enterprises with their great potential for employment, poverty alleviation, and environmental justice. Marsden and Smith (2004, 441) emphasize that in order to respond appropriately to emerging needs, "sustainable wealth creation and local economic development within the wider context of sustainable development require new entrepreneurial initiatives that focus on investing in the local environment. . . . employing people and their resources." Local green growth, therefore, requires a transformation that is influenced by the strong motivation to create new products; the act of doing so must then be perceived as a socially responsible investment strategy with competitive advantages for both investors and beneficiaries (Tandoh-Offin 2010; Young 2010). In addition to their potential for engaging in green, entrepreneurial practices, local people have been recognized for their natural expertise in practicing sustainable approaches to survival, which are derived from their perceptions, attitudes, and ecological identity. However, because of the demographic and economic pressures, local agricultural practices

also contribute to climate change risks. In other words, climate change and the alteration of the global atmosphere are directly or indirectly attributed to human activities, (Momodu, Akinbami, and Obisanya, 2011). Such barriers to encouraging agricultural entrepreneurship and consequent investments must be creatively transformed into opportunities for socially responsible economic growth; this transformation requires a critical analysis of entrepreneurial attributes.

Despite the fact that economic activities vary across cultures, local people in the concerned demographic are predominantly farmers. They initiate rural ventures within the context of agricultural entrepreneurship to aid in the production of food for the consumption of rural and urban people (FOA 2011; Ndenecho 2011). Production processes are closely tied to existing norms, implying that agro-ecological ventures are meant to serve more than economic interests because of their inherent cultural, social, and ecological values. But the globalization of the green economy should not be built on the false premise that external investment can sustainably ensure economic growth and environmental gains. On this note, Petrin (1994) warns that without the possibility of entrepreneurial capabilities that are well developed, external funds will be wasted on projects that will not provide long-term economic growth. Transforming the economy from brown to green or reinforcing existing green values requires a critical understanding of the human factors, needs, and cultural realities of local people as drivers of green ventures. In this article, I examine the human dimension of ecological entrepreneurship by exploring local needs and entrepreneurial dispositions as antecedents of environmental risk mitigation by people in the North West Region of Cameroon.

Theoretical Perspectives: The Planned Behavior Model

Theoretical models have been advanced to explain the motivation behind entrepreneurial action, and in this study, I employ the Theory of Planned Behavior (TPB) (Ajzen 1991) in order to understand the dynamics of ecological entrepreneurship. TPB has been extensively used to analyze entrepreneurial intentions in different contexts. The present study hypothesizes that the deposition of ecological entrepreneurship depends on attitudes, social norms, self-efficacy, and the ability to control the entrepreneurial action. The main variable of interest is intention, since without intention, action cannot occur; thus, it has become a fundamental element of analysis. Intention is the cognitive representation of an individual's preparedness to express a particular action, and is therefore a predictor of entrepreneurial behavior. The basic assumption holds that the decision to engage in entrepreneurial action occurs as a consequence of some inner belief or external change or pressure precipitating the event, and that an individual's response depends on perceptions of available alternatives (Liñán, Battistelli, and Moriano, 2008).

The TPB explains entrepreneurial intention as a function of three variables: attitude/attraction toward the behavior, social norms, and perceived behavioral control. The component of attitude/attraction refers to an individual's attitude toward the behaviors inherent in the practice of entrepreneurship. A more favorable attitude toward ecological entrepreneurship would make ecopreneurial action more feasible, while a less favorable attitude would portend the reverse outcome.

Another component of the model, the idea of social norms, involves the subject's perception of other people's opinions of the proposed behavior, and is understood to be an individual's assessment of social pressure to perform or not to perform entrepreneurial actions. At any given time, such "pressures can become a trigger or a barrier in the development of the entrepreneurial career, depending on the social environment" (Liñán, Battistelli, and Moriano, 2008, 23). Societal norms and their consequent pressures can influence and promote the ecological entrepreneurial behaviors and values that are expected of "ecopreneurs" and their activities.

The third component of TPB is perceived behavioral control, which relates to the perceptions of the behavior's feasibility as an essential predictor of the intended action. It is assumed that ecological entrepreneurs would like to work toward behaviors that they think could be controlled in the process of opportunity exploitation. The willingness to perform ecological venture activities (perceived desirability) would be a function of the attitude toward those activities, and of the perceived social norms held by people of a given society.

Evidence of Expanding Literature

Although the green economy and ecological entrepreneurship have recently emerged as panaceas to environmental risks, and in particular to climate change, literature that explains the context already abounds. Conceptualizations and empirical knowledge expose the relationships and interplay between factors that facilitate the understanding of the critical role of ecopreneurship investment in climate change mitigation and adaptation.

From Environmental to Investment Risks

In sub-Saharan Africa, subsistence agriculture is critical to income generation and food security, but ventures in this region are prone to both environmental and investment risks. According to Hill et al. (2010), financial institutions may be exposed to short-term losses due to flooding, storm surges, erosion, and higher energy costs. In the longer term decreased food production, increased health risks, and general instability from the loss of natural resources can have a negative impact on investment ventures. By overlooking the

traditional norms and values of the green economy, local people often foster the collapse of the earth's natural life support systems and attract risks. The United Nations Environmental Programme (UNEP) asserts that both conventional and traditional agriculture generate substantial pressure on the environment, and that the effects of climate change on food security are local and global (2011). Likewise, Momodu, Akinbami, and Obisanya (2011, 835) explain that "climate is an important factor of agricultural productivity, and at the same time agriculture is one of the main greenhouse gas sources, which is important to consider in terms of climate change." In addition, traditional smallholder agriculture is typically low-productivity farming that is practiced on low-value small plots. It relies primarily on the extraction of nutrients from the soil. Neither organic nor inorganic fertilizers are applied to sufficiently replenish those nutrients.

At present, the African Union (2011) has concluded that climate impact is critical and poses important challenges for agriculture that must be addressed through changes in agro-ecological conditions; these changes, in turn, will affect the distribution of income, especially to rural households. Within the context of green growth, "growth in income and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services" (UNEP 2011, 16). Although this viewpoint is quite optimistic, the potential for ecopreneurship investments is low, particularly in local communities, because environmental risk is still seen as an extraneous issue in mainstream finance and investment (Hill et al. 2010). Despite the recognition that green agriculture offers many opportunities for investment, financial institutions always express skepticism; thus, risk is attached to the practice of investing in environmental ventures. In the realm of green economic thinking, however, financial investing has been perceived as capable of reducing the vulnerability associated with anticipated negative impacts of climate risk. Such investing can be done through financial assistance to micro-eco-enterprises, particularly in rural localities.

Transforming Brown into Green: The Force of Ecological Entrepreneurship

At all levels, there have been recent, frantic efforts to transform the prevailing brown economy, characterized by fossil fuels, resource depletion, and environmental degradation, into a green economy with the inherent potential for economic growth, environmental progress, and social justice. Emanating from the ecological aggressiveness of the prevailing economic paradigm, the force of the green economy has been studied from the perspectives of "ecological entrepreneurship," "ecopreneurship," or "environmental entrepreneurship." Ecological entrepreneurship is considered to be the

main driver of the green economy, and has been described by Schaltegger (2002) as entrepreneurship through an environmental lens. It has a sound economic, ecological, and social justification, with the potential for becoming a new engine of growth, a net generator of decent jobs, and a vital strategy in the fight to eliminate persistent poverty (UNEP 2011). As part of the key investment attraction, the ecological entrepreneur is capable of transforming environmental risks into green business opportunities while minimizing those same risks. The practice of ecological entrepreneurship is equally a response to negative environmental externalities, undervalued natural resources, over-exploitation, and depletion of the earth's support system, which it combats by means of the introduction of eco-friendly products and processes into the marketplace (Pastakia 2002). Linnanen (2002, 72) clarifies that "most of the normal entrepreneurial laws, such as the correlation between risk and profit, the right timing for market entry and the need for adequate financial and human capital are valid also in environmental venture." Still, Schaltegger (2002, 46) cites the unique role of ecopreneurs, claiming that "whereas all entrepreneurs deal with bridging activities between suppliers and customers to create and change markets, ecopreneurs differ from conventional entrepreneurs in that they also build bridges between environmental progress and market success." Environmental entrepreneurship is applicable to any small business looking to increase growth since "ecopreneurship has thus become a diversified market-based approach for identifying opportunities . . . to convert dreams and aspirations into realities" (Tandoh-Offin 2010, 28).

In addition, green entrepreneurial perspectives are capable of providing a strong foundation for the creation and growth of micro-to-macro enterprises, considering that agricultural entrepreneurship is locked up in the green business framework (Mbebeb and Songwe 2011). Petrin (1994) recognizes that in rural communities, environmental entrepreneurship can improve the quality of life for individuals, families, and communities, and can enable the maintenance of a healthy economy and environment. This potential extends to the concept of rural entrepreneurship, "the use of traditional knowledge in the context of agricultural productivity and economic development to respond to climate change issues to achieve food security" (Momodu, Akinbami, and Obisanya 2011, 881). Such approaches embody a shift away from modern agricultural systems toward natural systems where the repressive properties of modern agriculture are abandoned for endogenous survival strategies.

Ecological entrepreneurship also implicitly entails the transformation of perceived and actual climate risks into opportunities, since agriculture-dependent communities are highly vulnerable to the effects of climate change. It emphasizes an economic system that enhances the earth's natural capital. This aspect of ecological entrepeneurship is extremely

pertinent to the situation in Africa, an area in which agricultural exploitation takes a central place (African Union 2011; Mbebeb and Songwe 2011). In terms of a motivational strategy, investing in resilient individuals and small-scale, home-grown activities has become an optimistic option in climate change mitigation, and has illuminated the fact that the transformation of survival strategies into systems and approaches capable of containing diversity needs is imperative. But such a framework, for instance, should "embody green farming and sustainable irrigation practices, as a way to conserve soil quality, enhance biodiversity and maintain higher levels of productivity to feed an expanding population" (African Union 2011, 8).

The green entrepreneurship model as a paradigm of diversity has behavioral implications that must be considered in the broader framework. To the African Union (2011, 3), "a green economy fuelled by green growth requires radical changes in behavior and shifting public opinion. . . . The greatest challenge thus lies with changing behaviors and transforming institutions to enable the adoption of sustainable patterns of production and consumption." This statement justifies the role of attitudes, motivations, norms, behavioral control, and intention in ecological entrepreneurship investment and sustainable development drives.

Local Pathways: Investing from Below

Historically, local people have always responded appropriately to diverse environmental conditions and potential risks by developing indigenous strategies. Patterns have emerged in the bottom-up approaches used to create sustainability in rural spaces (Marsden and Smith 2004). The act of investing from below implies that the social and cultural dimensions inherent in agricultural investments are generated as a way of life by the local people. Such cultural values are passed on from generation to generation through family and community socialization. Although public perceptions of green business often center exclusively on environmental technology (Linnenen 2002), the transition to a green economy varies across regions due to the level of development and resources in the relevant area (UNEP 2011). This fact accounts for the different responses that help create the indigenous strategies of each unique location. Customary laws, shared values, and belief systems constitute an integral part of a local people's lifestyle and directly influence their inbuilt ecovalues. In local communities, indigenous knowledge has been directly applied to weather forecasting, vulnerability assessment, and the implementation of adaptation strategies in agriculture (Nyong, Adesina, and Osman-Elasha 2007). Due to its green growth potential, endogenous agricultural entrepreneurship is now considered one possible solution in the global quest to diminish the risks of climate change. Local pathways, although often sidelined, are therefore vital in preserving biodiversity, and are

considered by many to be very successful mitigation strategies. Again, local people interpret and react to the effects of climate change in creative ways, drawing on traditional knowledge and new technologies. Farmers are known to make decisions on cropping patterns based on locally derived climate predictions and often determine their planting dates based on complex cultural models of weather (Nyong, Adesina, and Osman-Elasha 2007). Such skills are acquired through social learning processes that generate collective knowledge. It is therefore necessary to integrate indigenous knowledge and values into the mainstream strategies used to mitigate climate-change within the diversity paradigm.

The gender dimension of ecological entrepreneurship is of equal importance, especially in rural areas. Women in developing societies are principally concerned with food crop production, but regrettably lack an enabling environment (Fonjong 2004; Petrin 2004). As agricultural entrepreneurs with small-scale holdings, women are vulnerable to the risks of climate change; however, this situation could be transformed into great opportunities for everyone's benefit through the possibilities offered by ecological entrepreneurship.

The Context of the Study

In Cameroon, agriculture is the life-wire of the economy in terms of employment, food security, and the provision of raw materials to the industrial sector (Ndenecho 2009; Fonjong 2004). Rain-dependent subsistence farming typifies the rural communities of the area. In this study, I focus on the north westerners of Cameroon, who are commonly known as people of the grassfield because of the area's savannah vegetation. In this region, agriculture remains the mainstay of the economy and the source of livelihood for men, women, and young people, but is largely characterized by small-scale family farms. The environment of the people meets their ecological, social, and economic needs, and it is usually governed by traditional injunctions or norms of exploitation. Before the advent of chemical fertilizers, local farmers largely depended on organic farming, and today use local approaches to soil conservation, such as zero tilling in cultivation, mulching, and other soil management techniques. To ensure their ecological identity, the people have learned to understand the ecosystem and how to relate to it according to core farming values and customary regulations.

But despite the desire of the people to live in harmony with nature, the demographic pressure, economic motives, and farming approaches are the main sources of environmental risks. Orthodox methods of resource exploitation degrade the environment, and young people remain jobless, underemployed, and poor as a result (Mbebeb and Songwe 2011). Environmental risk, therefore, remains a critical problem due to discrepancies between economic, sustainable livelihood values and ecological values.

Ndenecho (2009, 27) laments that "traditional farming systems, which over centuries developed in constant interaction with local culture and local ecology, have disintegrated because of the lack of local capacity to adjust to population growth and the influence of foreign values." This means that the people face a major threat to their beliefs about farming systems, particularly with regard to the perception of farming by young people.

The Green Growth Project

Motivated in recent years by the need to simultaneously address environmental degradation and boost income generation at the local level, a number of projects have been implemented in developing countries (UNEP 2011). But despite the increase in environmental and social challenges, only a small number of leading businesses are taking significant action to mitigate future environmental risks (Hill et al. 2010). This article focuses on one such program, the green growth project of Youth Outreach Programme-Cameroon, supported by the United Nations Human Settlements Programme *(*UN–HABITAT). The project was designed to promote the economic and social inclusion of young people through investments in market gardening and poultry farming, with an emphasis on organic farming values as part of a climate-change mitigation strategy. The first phase of the initiative involved capacity building relating to organic farming; it also included a focus on entrepreneurial competence, environmental risks, ecological attitudes, and self-conceptions. The study hypothesized that upon participating in training, young people would have a more favorable attitude toward ecological entrepreneurship and start-up creation with regard to micro-agro-business. The study was designed to respond to the following fundamental questions:

1. Is green business training capable of encouraging favorable ecopreneurship attitudes in local youths, and of promoting ecopreneurship as a strategy for achieving a sustainable livelihood and environmental risk mitigation?
2. Are social norms sensitive factors in determining ecological entrepreneurial attitudes in young people?
3. Can attitudes and social norms as single and combined factors predict the ecological entrepreneurial intentions of young people?
4. With regard to attitude and levels of intent, are there any significant differences between the males and females?

Methods of Investigation

This small study used a correlational design to assess the role of participants' attitudes, social norms, and ecological entrepreneurial intent with regard to green business

investment and to determine if they were antecedents of economic growth and environmental risk mitigation. Forty-four local young people (n=25 females and 19 males) drawn from the green economy project of Youth Outreach Programme-Cameroon constituted the sample. The majority of participants (43.2%) fell within 26 to 30 years of age, were unmarried, and had secondary school graduation certificates. An adapted version of the Entrepreneurial Intention Questionnaire (EIQ) (Liñán, Battistelli, and Moriano, 2008) was used to assess the ecological entrepreneurial dispositions of participants. The test included four subcategories pertaining to attitudes, social norms, perceived behavioral control, and intention. In addition, some open-ended questions were presented to participants to obtain qualitative information. Following the training, participants filled out the questionnaires and returned them immediately after completion. Data were entered using the Statistical Package for Social Sciences (SPSS), and descriptive and inferential statistics were used to analyze the data. The scale's internal reliability coefficient was determined with Cronbach's alpha: attitude (α =.72), social norms (α =.60), perceived behavior control (α =.74), and ecological intention (α =.86).

Results of the Study

In order to examine the place of green agricultural entrepreneurship as a driver of livelihood and environmental protection, the pretraining occupations and post-training aspirations of local youths had to be identified (Figure 1). Before capacity building, the majority of the youths invested in small businesses, but after training, local youths expressed more interest in becoming ecopreneurs. This response indicated a shift toward organic agriculture, income generation, and environmental protection.

Figure 1: Pre-training Occupations and Post Aspirations

Occupations	**Count**	**% Resp**	**% Cases**		**Prospective career**	**Count**	**% Resp**	**% Cases**
Teaching	1	2.4	2.9		Eco-entrepreneur	34	69.4	77.3
Small business	15	36.1	44.1		Employer	6	12.2	13.6
Crop farming	13	31.7	38.2		Civil servant	7	14.3	15.9
Poultry farming	4	9.8	11.8		Formal sector	2	4.1	4.5
Gardening	4	9.8	11.8		-	-	-	-
Sewing/design	4	9.8	11.8		-	-	-	-
Total responses	41	100	120.6		**Total responses**	49	100.0	111.4

Source: Field investigation.

The drivers of ecopreneurship and the ensuing challenges experienced by local youths were subject to analysis. Achieving a rewarding career and creating jobs appeared to be the most powerful motivators for undertaking green business ventures, which include investments in ecological entrepreneurships such as the scaling up of organic agriculture. The greatest investment barrier was the lack of capital, followed by mismanagement and a low skill base (Figure 2).

Figure 2: Ecopreneurship Drivers and Investment Barriers

Eco-drivers	Count	% Resp	% Cases		Investment Barriers	Count	% Resp	% Cases
Creativity	6	9.5	14.0		Lack of capital	33	67.3	80.5
Flexibility	1	1.6	2.3		Low skill base	6	12.2	14.6
Profitability	8	12.7	18.6		Mismanagement	8	16.3	19.5
Autonomy	9	14.3	20.9		No cooperation	2	4.1	4.9
Experience	4	6.3	9.3		-	-	-	-
Train others	5	7.9	11.6		-	-	-	-
Create jobs	10	15.9	23.3		-	-	-	-
Rewarding career	20	31.7	46.5		-	-	-	-
Total responses	63	100	146.5		**Total responses**	46	100.0	119.5

Source: Field investigation.

Further analysis revealed the future perspectives of young people with regard to investing in ecological entrepreneurship (Figure 3). Though the results isolated financial difficulties as a principal challenge, they also revealed that participants expected education and workshops to be key values in realizing agricultural ventures.

Figure 3: Investment Perspectives of Local Youths

Investment perspectives	Count	% Responses	% Cases
Eco-entrepreneurship training	3	6.1	7.1
Monitoring	4	8.2	9.5
Saving income and profit	4	8.2	9.5
Education/workshop	27	55.1	64.3
Credit facilities	2	4.1	4.8
Financial support	9	18.4	21.4
Total responses	49	100.0	116.7

Source: Field investigation.

With regard to the conceptual framework of the study, the extent of the relationships between core variables was explored (Figure 4). Green business attitudes showed a high, positive correlation with perceived behavior control and ecopreneurship intentions, but a low association with social norms. There was evidence of a significant positive relationship between perceived behavioral control and intent. Age appeared to be significantly associated with matrimonial status and intent, but also demonstrated a marked negative correlation to gender. In general, the variables exhibited a positive correlation, proving themselves to be instrumental in understanding the dynamics of ecological entrepreneurship investment as a livelihood measure and a possible component of environmental risk mitigation.

Figure 4: Bivariate Correlation Analysis, Mean, and Standard Deviation

Variables	1	2	3	4	5	6	7	N	Mean	Std Dev
Gender (1)	-	-.299*	.203	.011	.104	.003	.039	44	1.57	.50
Age (2)		-	.383**	.338*	-.008	.251	.502**	44	2.64	.83
Matrimonial status (3)			-	.055	-.006	.189	.203	44	1.27	.49
Attitude (4)				-	.302*	.579**	.790**	44	29.68	4.05
Social norms (5)					-	.250	.362*	44	16.86	2.86
Behavior control (6)						-	.776**	43	33.62	5.37
Intention (7)							-	44	35.61	6.79

* Correlation is significant at the 0.05 level (1-tailed).
** Correlation is significant at the 0.01 level (1-tailed).

Source: Field investigation.

In order to determine whether social norms could predict ecological entrepreneurship attitudes, a simple regression was performed (Figure 5), and the results indicated that social norms significantly predicted attitude: $R = .30$; $R^2 = .09$; $\Delta R^2 = .07$, $p < 0.05$. Although it confirmed the assumption that social norms exert influence on ecological entrepreneurship attitudes, the model only accounted for a .07% variation in participants' attitudes.

Figure 5: Regression of Ecopreneurial Attitudes on Social Norms

	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
Model					R Square Change	F Change	df1	df2	Sig. F Change	1.701
1(a)	.302	.091	.070	3.91246	.091	4.223	1	42	.046	

a Predictors: (Constant), subjective norms
b Dependent Variable: attitude

Source: Field investigation.

In the study, it was assumed that, at different levels of analysis, attitudes and subjective norms could significantly predict the ecological entrepreneurship intentions of participants. Model 1 showed attitude to be a significant predictor of ecological entrepreneurship: attitude accounted for a 61.4% variation in participants' intention levels. In the second model, the combination of attitude and social norms clearly predicted ecological entrepreneurship intent. Attitude and social norms accounted for a 62.2% variation in participants' intention levels, thus confirming the assumption that attitude and subjective norms could greatly influence the ecological entrepreneurship intentions of youths (Figure 6).

Figure 6: Ecopreneurial Intent Regressed on Attitude and Social Norms

	R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Change Statistics**					**Durbin-Watson**
Model					R Square Change	F Change	df1	df2	Sig. F Change	1.839
1(a)	.790	.623	.614	4.218145	.623	69.530	1	42	.000	
2 (b)	.800	.640	.622	4.173976	.017	1.894	1	41	.176	

a Predictors: (constant), attitude
b Predictors: (constant), attitude, social norms
c Dependent variable: intention

Source: Field investigation.

In relation to green venture attitudes and start-up intention levels, male-female differences were subjected to analysis (Figure 7). Based on group statistics, female participants, on average, indicated a more favorable attitude toward ecopreneurship than did males (Males: N = 19; M = 29.63; SD = 3.89; SE = .89, Females: N = 25; M = 29.72; SD = 4.25; SE = .85). With regard to intention levels, the scores of the female participants, on average, were higher than those of the males (Males: N = 19; M = 35.31; SD = 6.41; SE = 1.47, Females: N = 25; M = 35.84; SD = 7.19; SE = 1.43). Despite the observed differences between the two groups, analysis using t-statistics didn't offer any significant results in terms of attitude (t (42) = -.071, p.>05) or intention *(t* (42) = -.251, p. > 05) for either group.

Figure 7: Independent Sample Test for Male and Female Youths

		Levene's Test for Equality of Variances		T-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Attitudes	Equal variances assumed	.020	.888	-.071	42	.944	-.0884	1.24913	-2.60926	2.43242
	Equal variances not assumed			-.072	40.510	.943	-.0884	1.23354	-2.58052	2.40368
Intention	Equal variances assumed	.210	.649	-.251	42	.803	-.52421	2.090490	-4.742990	3.694569
	Equal variances not assumed			-.255	40.860	.800	-.52421	2.057422	-4.679691	3.631269

Source: Field investigation.

The two groups showed no significant mean difference despite the differences that were revealed in the group statistics. Consequently, ecological entrepreneurship attitudes and intention levels for male and female participants were the same. This confirms the prior belief that agricultural entrepreneurship is the mainstay of local people. The young people of both genders are socialized into farming activities during childhood to help them achieve sustainable livelihoods with responsibility and intelligence.

Discussion

The main aim of this study was to explore how local survival strategies could provide sustainable solutions to emerging environmental problems. The analysis of current and future youth activities show a shift toward ecological entrepreneurship, suggesting that capacity building is an essential factor in building green business ventures. Before training, the subjects' livelihood activities were characterized by disorganization and uncertainty. After training, however, the participants became more focused on ecopreneurship, which denotes a shift in their attitudes and intentions toward agricultural entrepreneurship. This is consistent with prior propositions and studies on the subject, which have found that the more often young people are exposed to green enterprise education and training, the more positive their attitudes and behaviors are likely to be (Mbebeb and Songwe 2011; Schaltegger 2002; UNEP 2011) with respect to green venture drives.

Behavioral expressions are influenced by motives and justify the analysis of ecological entrepreneurship drivers. The emerging recognition of ecopreneurship as a rewarding career and the acknowledgment of its plausible profitability serve as strong motivations

for engaging in ecopreneurial activities. In addition to satisfying these needs, ecopreneurship has the potential to generate solutions to climate risks according to social and ecological values. This idea concurs with the popular opinions about and advocacy of sustainable ecological entrepreneurship (FAO 2011; UNEP 2011) that are supported by recent studies on food security, poverty, and climate change mitigation (Fonjong 2004; Momodu, Akinbami, and Obisanya 2011). Despite the interest of local youths in fostering green investments, moderating factors abound. Although low skill base and mismanagement appeared in the results of the study as factors that could potentially inhibit green business investments, a lack of capital is the most anxiety-provoking factor. Investigations into existing green business practices have isolated financial assistance as a drive-reduction factor (Hill et al. 2010; Tandoh-Offin 2009; Young 2010) and, particularly in Africa, the involvement of financial institutions and social financial initiatives in aiding the green economy therefore becomes imperative. Participants in the study went further in validating their positive attitudes toward and motivations for pursuing green investments by advancing responsive strategies. Despite the poor financial situation of local youths, they identified education and participation in workshops as optimistic pathways. Traditionally, education and training have been found to be key motivators in influencing start-up intentions and actualizing green ventures (Mbebeb and Songwe, 2011; UNEP 2011), which suggests that more training opportunities for young people in agricultural entrepreneurship should be made available.

Evidence derived from correlation analysis confirms that the core variables of the study were mutually supportive in fostering a model of ecological entrepreneurship in a local context. The prevalence of relationships between the variables demonstrates that they are critical to the development of an entrepreneurial intention framework for further exploration, validation, and scale up. The strong relationship between social norms and attitudes uncovered in the study is indicative of these factors' significant influence as predictors. The study also can be seen as a validation of the people's lifestyle as a driver of needs satisfaction, economic growth, and social justice. These results coincide with prior observations about green growth strategies (FAO 2011; UNEP 2011) and with recent studies undertaken within the context of the green economy and climate change Momodu, Akinbami and Obisanya 2011; Ndenecho 2009; Nyong, Adesina, and Osman-Elasha 2007).

Furthermore, attitudes and social norms were shown to significantly predict ecological entrepreneurship intention, indicating that the more favorable the attitudes of local people, the higher the probability of actualizing green business. Considering that attitude is a predisposition, inducing favorable attitudes through education and training becomes critical. Recent findings (Mbebeb and Songwe 2011) have revealed that favorable

attitudes toward green agriculture are capable of influencing actual behaviors relating to effective practices. The power of social norms to affect ecological entrepreneurship intentions also lies in the way local people perceive farming as a cultural value and as a survival mechanism; failure to conform to the preordained agricultural standards is tantamount to disapproval by the community. These findings are consistent with investigations on social pressure, farming, and cropping behaviors in rural communities (Fonjong 2004; Nyong, Adesina, and Osman-Elasha 2007). Such a situation is a positive valence, considering that by understanding climate risk, local people could be capable of fostering green action and investment attractions.

The place of gender in ecological entrepreneurship and climate risk mitigation cannot be underrated. With regard to ecological entrepreneurship attitudes and intentions, differential analysis indicated no significant difference between males and females. The results are similar to Petrin's (1994) observation, which found no differences between male and female entrepreneurs in terms of their propensity toward risk taking. Despite traditional perceptions, findings suggest the need to invest more in female ecological entrepreneurs, which has long been ignored, considering their roles as drivers of livelihoods. The present result could be explained by the significant effect of awareness creation and training on the women, and this is accounted by the fact that although men are traditionally perceived as more preoccupied with productive activities than women, the later is making significant attempts to meet up with the challenges. This fits well with the growth of green agricultural entrepreneurship since small social-based entrepreneurship is a traditional occupation of most women in rural communities.

Conclusion

In this study, I have examined how local people as rural entrepreneurs satisfy their needs while providing environmental solutions for minimizing climate change risks. The results from using the planned behavior model revealed lessons that illuminate how to transform micro-green-enterprises into giant structures. When considering ecological entrepreneurship as a prominent part of the green-growth, paradigm, it is necessary to "stress the usefulness of the new approaches to business development that have or are revolutionizing environmental management practices around the world" (Tandoh-Offin 2010, 33). These new approaches are often resource intensive, especially for the poor rural people involved, and are no doubt challenging to incorporate into ecological entrepreneurial practices; their implementation, therefore, should build on the cultural values and needs of the local people. Honoring these traditions might also help to avoid dissonance and noncompliant behavior that could result from possible inconsistencies occurring between ecological entrepreneurial attitudes and actions.

Local communities are generally blessed with an abundance of natural resources that permit a wealth of green opportunities for agricultural entrepreneurship. Awareness creation and skills development are necessary to persuade many youths to get on board the green economy platform. The primary task is to influence perceptions and attitudes and to motivate good investment behaviors built on an endogenous economy. This idea comes from the recognition that cognitive constructs play a vital role in reinforcing social norms and in facilitating start-up intentions with regard to green ventures. The possibility of financing pro-poor green investment, particularly from the perspective of social financing, is encouraging considering that rural people are mainly subsistence crop producers with little or no capital for expansion. In any event, critical observation holds that ecopreneurs require access to financial services, and that training is essential to help them grow and create wealth. Financial barriers are contextually likely to moderate the link between planned behavior (intention) and ecopreneurship ventures. Although a growing range of products could be introduced to address environmental risk in the finance sector through eco-friendly lending schemes and investment practices (Hill et al., 2010), such opportunities are largely reserved for eco-initiatives in advanced countries. Only development agencies stand to assist local investors (individuals, local groups, and nongovernmental organizations) in actualizing green economy ventures in rural localities.

Results obtained from the sample show the power of social norms in influencing ecopreneurship attitudes and intention levels. Considering that communities rely on a social capital base, local groups could be encouraged to resuscitate local knowledge and values and integrate them into the mainstream green-growth paradigm. The assumption is that this integration of indigenous cultural ideas into mainstream, climate-change mitigation strategies would aid in the response to emerging and diverse environmental externalities. It should be recalled that "finding ways to protect global ecosystems, reduce the risks of global climate change, improve energy security, and simultaneously improve the livelihoods of the poor are important challenges in the transition to a green economy, especially for developing countries" (UNEP 2011, 19-20). This statement summarizes the challenges inherent in the present discourse. In addition to developing resilience in individuals, a growing green economy must transform traditional rural subsistence entrepreneurs, mobilize local resources, and create a supportive environment, particularly with the help of governmental policy. While acknowledging the general trend toward a green economy, the study results also suggest the need for more policy and action-oriented research activities with the involvement of the social and behavioral sciences, which are capable of explaining behaviors with regard to ecological entrepreneurship interventions.

It is also worthwhile to note the limitations of the study. The use of the theory of planned behavior model could have been constrictive, considering that the present environment is

not entirely supportive of ecopreneurship, and that intentions toward engaging in entrepreneurial activities are hardly ever realized due to financial, policy, and capacity barriers. This suggests the need for an extension to the model capable of considering moderating factors in the intention-action process. At the methodology level, the number of participants used was low, which could pose problems in terms of validity and generalization. The study also solely considered green agricultural entrepreneurs, who are just a subset of the entire ecological entrepreneurial population. Considering that it was one of the rare small-scale projects focused on the green economy, moderate lessons, critical incidents, and stimulating ideas could still be adapted for use in necessary theory building, validation, and practice.

References

African Union Commission and UNEP. 2011. "A Green Economy in the Context of Sustainable Development: What Are the Implications for Africa?" Addis-Ababa: Meetings of the AU Conference of Ministers of Economy and Finance and ECA Conference of African Ministers of Finance, Planning and Economic Development. (March): 24–27.

Ajzen, I. 1991. **"**Theory of Planned Behavior." *Organizational Behavior and Human Decision Processes* 50: 179–211.

Fonjong, Lotsmart. 2004. "Challenges and Coping Strategies of Women Food Crops Entrepreneurs in Fako Division, Cameroon." *Journal of International Women's Studies* 5(9): 1–17.

Food and Agriculture Organization of the United Nations (FAO). 2011. *The State of Food and Agriculture 2010–2011: Women in Agriculture: Closing the Gender Gap for Development.* Rome: FAO.

Hill, Margot, Ivo Mulder, Jessica Boucher, and Jemma Green. 2010. "Embedding Environmental Risks in Finance: Current Methods and Ongoing Challenges." *Journal of Environmental Investing* 2(1): 36–51.

Liñán, F., A. Battistelli, and J. Moriano. 2008. "Entrepreneurial Intention in Europe." In *Teaching Psychology of Entrepreneurship Perspectives from Six European Countries*, edited by J. Moriano and M. Gorgievski, 21-44. Madrid: Universidad Nacional de Educación a Distancia.

Linnanen, Lassi. 2002. "An Insider's Experiences with Environmental Entrepreneurship." *Greener Management International* (*GMI*), no. 38 (Summer): 71–80.

Marsden, Terry, and Everand Smith. 2005. "Ecological Entrepreneurship: Sustainable Development in Local Communities Through Quality Food Production and Local Branding." *Geoforum* 36: 440–451.

Mbebeb, Fomba Emmanuel, and Omer Songwe. 2011. "Promoting Ecopreneurship Behaviors in Sustainable Resources Exploitation: Greening Youths for Green Business in Cameroon." Accra, Ghana: International Conference on Sustainable Development of Natural Resources in Africa, UNU-INRA (December): 5–8.

Meek, William, Desiree Pacheco, and Jeffrey York. 2010. "The Impact of Social Norms on Entrepreneurial Action: Evidence from the Environmental Entrepreneurship Context." *Journal of Business Venturing* 25: 493–509.

Momodu, A., C. Akinbami, and J. Obisanya. 2011. "Achieving Food Security and Climate-Change Mitigation Through Entrepreneurship Development in Rural Nigeria: Gender Perspective." *African Journal of Environmental Science and Technology* 5(10): 834–854.

Ndenecho, Emmanuel. 2009. "Cropping Systems and Post-Cultivation Vegetation Successions: Agro-Ecosystems in Ndop, Cameroon." *Journal of Human Ecology* 27(1): 27–33.

Nyong, A., F. Adesina, and B. Osman-Elasha (2007). "The Value of Indigenous Knowledge in Climate Change Mitigation and Adaptation Strategies in the African Sahel." *Mitigation and Adaptation Strategies for Global Change* 12: 787–797.

Pastakia, Astad. 2002. "Assessing Ecopreneurship in the Context of a Developing Country: The Case of India." *GMI* no. 38 (Summer): 93–108.

Petrin, T. 1994. "Entrepreneurship as an Economic Force in Rural Development." Herrsching, Germany: Keynote paper presented at the Seventh FAO/REU International Rural Development Summer School, 8–14 September. Accessed February 12, 2012. Available from http://www.fao.org/DOCREP/W6882e/w6882e02.htm.

Schaltegger, Stefan. 2002. "A Framework for Ecopreneurship Leading Bioneers and Environmental Managers to Ecopreneurship." *GMI* no. 38 (Summer): 45–58.

Tandoh-Offin, Patrick. 2010. "A Review of Environmental Entrepreneurship as an Agenda for Rural Development: The Case for Ghana." *Journal of African Studies and Development* 2(2): 27–34.

United Nations Environmental Programme (UNEP). 2011. *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication—A Synthesis for Policy Makers*. Accessed, June 15, 2011. Available from http://www.unep.org/greeneconomy.

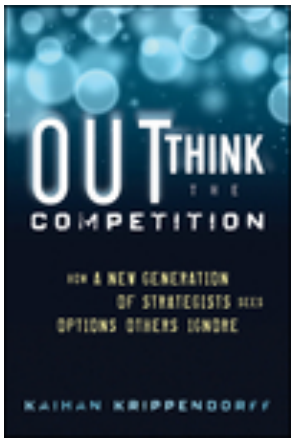
United Nations Organisation. 2011. "Treat Farmers like Entrepreneurs to Boost Creation of Wealth, Jobs, Urges Delegate as Second Committee Concludes Debate on Agriculture Development, Food Security." Sixty-sixth General Assembly. Accessed February 5, 2011. Available from http://www.un.org/News/Press/docs/2011/gaef3318.doc.htm

Young, Shari. 2010. "Turning Green into Green: Social Past, Financial Future." *Journal of Environmental Investing* 1(2): 7–28.

Biography

Mr. Fomba Emmanuel Mbebeb is currently undertaking PhD studies while lecturing in psychology at the University of Dschang, Cameroon. He has a master's degree in psychology from the University of Lagos, Nigeria, and an active interest in and passion for development work. He has been exploring the extended role of psychology within the framework of sustainable development and strives for an inclusive science that is socially constructed from the indigenous knowledge systems of the people, with a particular focus on the human dimension of the environment and natural resources exploitation. His most recent research includes exploration of the green economy paradigm, ecological entrepreneurship, positive youth development, workforce preparation, indigenous knowledge production, and small-scale agro enterprises.

Book Review



Outthink the Competition: How a New Generation of Strategists Sees Options Others Ignore, by Kaihan Krippendorff; Hoboken, NJ: John Wiley & Sons, Inc., 2011, 246 pp., US$24.95 (hardcover), 256 pp. US$16.99 (eBook)

Reviewed by Karoline Barwinski

As a sustainability analyst, I am perpetually analyzing how environmental, social, and governance practices and initiatives bring value to an enterprise. They can not only enhance a company's reputation, reduce its environmental footprint, maintain its good standing in the communities where it operates and provide access to new markets, but, in fact, can also help mitigate risk and enhance a company's competitiveness in the long term. Further, it seems that companies that set a new barometer in a business process or that create a new market with high barriers to entry are the ones winning in the marketplace and gaining a competitive edge. In *Outthink the Competition,* we learn exactly how successful companies are adapting to an evolving business environment, embracing strategies that disrupt the market, and bringing successful and sustainable results to their business and stakeholders. Through countless case studies, Kaihan Krippendorff embraces and advocates the idea that "to win any strategic game, be it war, business, or chess, you must make a few strategic choices that will so disorient the competition that they will not be able to respond effectively." This is the basis of the book, written as a guide for business people who think creatively, have a vision, and want to disrupt the marketplace in a way that proves sustainable to their business in the long term.

A New Playbook

Krippendorff begins the book with a chapter on the presently occurring business revolution and presents nine trends that are transforming our world and the environment in which companies do business. Some of these decisive shifts include The Erosion of Economies of Scale, Free Flow of Information, Self-Organized Citizens and Customers, and The Shift in Power Toward the Developing World. Krippendorff claims that the

companies that are winning today are adjusting to these shifts and changing how they strategize and run their businesses. In other words, the playbook by which companies are used to operating and doing business is antiquated, and a new playbook of strategies is emerging. As he began his research, Krippendorff started seeing a gradual shift from a traditional strategic approach and sources of advantage (the old playbook) to completely new ways in which the winners are applying competitive efforts. He translates the new playbook into five strategies:

Old Playbook	**New Playbook**
1. Achieve customer captivity. 2. Secure preferential access to resources. 3. Build economies of scale. 4. Adopt best practices.	1. Move early to the next battleground. 2. Coordinate the uncoordinated. 3. Force two-front battles. 4. Be good. 5. Create something out of nothing.

While all five of these strategies play an important role in the new playbook, *Be Good* stood out to me for obvious reasons. It is inspiring to read in a business strategy book that an important piece of the puzzle is being a sustainable company not only from an economic sense, but also from a human capital, environmental, community, human rights, and governance perspective. Krippendorff exclaims that *being good* builds *moral force* and offers examples from ancient battles, to sports, to business, where moral force is the driver for a dedicated army, team, or group of employees who are pursuing a greater universal goal that binds them together as a team. Such a mindset and driver allows the unit as a whole to succeed, and to get ahead of the other "players."

He further emphasizes that in business, once the moral force is built, it fuels a larger class of stakeholders—the communities, shareholders, employees, government, and customers—that root for the company to out-compete its peers. Additionally, he writes that *being good* builds followership and can be used as a tool for solving societal problems because companies that do so "trust that being sustainable will come back to benefit them in some way, even if they cannot right now see or predict the chain of events that will benefit them." (Krippendorff, 72) This, I believe, speaks to the essence of a successfully integrated sustainability or corporate responsibility strategy. But, to go a step further, companies that operate sustainably find ways of creating shared value that result in social

and environmental returns, as well as economic returns. Krippendorff's research shows that companies that embrace *being good* "enjoy a more complete competitive advantage." (Krippendorff, 74)

The Outthinker Process: IDEAS

While maintaining these five strategies, Krippendorff presents the "outthinker" process by using a simple-to-remember and easy-to-apply acronym: IDEAS. It helps outthinkers look at a challenge and see a strategic solution. A brief description of each step in the process is provided in Figure 1.

Figure 1: IDEAS

Imagine	What is the long-term ideal? Step forward in time and imagine a future that's different from today and how what you do is going to play into that.
Dissect	Dissect the problem into several issues or drivers so you see from a point of leverage that others don't see and decide which key issues to address now.
Expand	See more options than your competitors. Generate as many strategies or ideas as possible to tackle the issues.
Analyze	Select which ideas you'll execute, no matter how outlandish they seem. Only choose the options that customers will love and that competitors can't copy.
Sell	Determine whom to convince and what the message is that you are trying to bring across to sell the idea effectively.

He firmly believes in this process because he has seen it applied many times with success. The "managers that apply it consistently see exciting new possibilities for solving real challenges. . . . [And] when a group of people begins adopting the process, it can actually bring about a shift in culture, where innovative thinking is no longer confined to one department, but becomes part of the company's normal atmosphere." (Krippendorff, 128) I can't help seeing parallels with this way of thinking and the integration of sustainable practices and initiatives throughout a company, including the potential for value creation that this process can induce if applied with an eye on sustainability. As sustainability is adapted in a systematic way throughout an organization, not only are the employees inspired to meet the greater expectations but the entire company as a unit may operate more efficiently, innovatively, and with a smaller environmental footprint as well.

Shaping Perceptions

In addition to presenting the scenario of a changing business paradigm, backing it up with concrete examples, and framing it into a strategy that makes sense, Krippendorff offers another piece to the puzzle of driving a successful and winning business: the five habits of outthinkers. One of the habits he outlines is *shaping perceptions.* This gets to the important, yet frequently overlooked, psychological aspect of doing business. Outthinkers know the importance of enrolling stakeholders into the plan, even when it is painstakingly difficult, until the winning idea becomes evident and clear to everyone. This is what is happening in the environmental, social, and governance (ESG) investing space, but perhaps needs to happen in a more methodical way. Companies must realize that operating with an awareness of the environmental, social, and governance issues that affect their business is a necessity of doing business in the current environment and can create value. And investment managers must see the importance of integrating these ESG issues into their investment analyses in order to select best-in-class economically, socially, and environmentally sustainable firms that will bring long-term value to shareholders.

Further, we also need to shape the perceptions and get the buy-in of mainstream analysts on the materiality of these issues. Stepping back to the beginning of the book, Krippendorff outlines the challenges to outthinking the competition, including: 1) You must first recognize where the rigidity has taken hold; 2) You must then find a new strategic option that others ignore; 3) You must figure out whether this new strategy is superior; and 4) You must slow your competitors' ability to copy your innovation. The challenge in the ESG investing space is getting mainstream analysts to come out of the rigid thinking that short-term earnings matter above all else, determine how greater societal, economic, environmental, and governance issues affect the companies they cover in the long term, and ascertain how the companies respond to those issues. In so doing, they would be adjusting their strategic approach to investing in the context of the current state of the world and play a part in raising the bar for everyone. Of course, before making any decisions on embracing new policies and practices related to sustainability, it is paramount that a company first examine the particular marketplace environment within which it operates, and assess its strategic priorities and business needs, including its relationships with stakeholders. However, in the long term, such a systematic integration has the potential to produce positive results for the business and long-term shareholders.

Sustainability as Part of Outthinking the Competition

As the business environment has evolved, Kaihan Krippendorff has identified an effective strategy and process for winning in the marketplace. *Outthinking the competition* means understanding the context within which a company operates and redefining the product, service, market, and culture for a more sustainable future. This book was written for business leaders seeking to reignite creative and visionary energy in an organization and redefine market opportunities that produce a successful and sustainable enterprise. By bringing this strategy into the context of sustainability—where a culture of sustainability, innovation, and good governance and a firm understanding of the societal and environmental factors that affect the business permeate an organization—the potential for shared value-creation from the economic, social, and environmental perspective rises. In the context of today's world and the changing business environment, outthinkers see the synergies between economic factors and sustainability. As a result, they have the potential to disrupt the marketplace in such a way as to create long-term value for their business, as well as for their shareholders.

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Finding the Longitude, from Maskelyne and Harrison to Perera and Clements-Hunt: A Social Review of UNEP FI's *Financial Stability and Systemic Risk: Lenses and Clocks*

Financial Stability and Systemic Risk: Lenses and Clocks by Paul Clements-Hunt; a joint paper presented by the United Nations Environment Programme Finance Initiative (UNEP FI), the International Institute for Sustainable Development (IISD), and The Blended Capital Group (TBCG); Geneva: Switzerland, 2012, 67 pp. Available from http://www.iisd.org/publications/pub.aspx?pno=1375

Reviewed by Leland Lehrman

If the reader will oblige, I'd like to take advantage of the fact that this is a book review rather than a scholarly article to provide a "social review" of UNEP FI's latest contribution to the evolution of investment in civilization. Just so there is no confusion arising from my occasional mild critiques, readers will not be surprised that I consider UNEP FI to be the single most important division of the UN, as well as perhaps the most progressive governance institution in the world. This conclusion derives in part from the revision to fiduciary obligation made by UNEP FI in its Fiduciary 2 paper in 2009. Fid 2, in the tradition of the Magna Carta, established for the legal record the opinion of many estimable global lawyers that the fiduciary obligation extends to nonfinancial metrics and standards such as quality of life and ecological health. With the addition of the manifold updates to investment perspective afforded by *Lenses and Clocks*, UNEP FI now stands as the leading organization affecting the evolution of investment in a world where investment, rather than law or religion, provides the primary modus operandi for civilization's design or lack thereof.

I won't pretend to agree that such a state of affairs is a good thing. The evolution of the largely one-dimensional investment world has flattened and homogenized society in many ways to its detriment. Many alternatives to compliance token finance (numerical taxable currency) exist, from indigenous, self-reliant trading circles to time banks to social credit systems. But from a tactical point of view, UNEP FI is providing a framework for effective global intervention in a capital market rife with dysfunction and abusive behavior.

Before we look at the details of the document, I have a few more thoughts on the implicit communication in it, First of all, on the cover, you will find a picture of Big Ben, the famous clock in the Tower of London. In an age of networked atomic clocks, Big Ben seems quaint; but if you were to journey back in time to London's heyday, you would find that Big Ben, along with the Naval Observatory in Greenwich, provided the central timing control function for the largest geographic empire the world has ever known. Just recently, I stumbled upon the history of "finding the longitude," the process by which it became possible to keep accurate time across time zones for navigational purposes and thus reduce casualties at sea from navigational error. A fascinating story, it boils down to a journey from Nevil Maskelyne's lunar navigation tables to John Harrison's marine chronometers capable of keeping time without a pendulum. Why do I cite these facts? Because the paper's subtextual communications reveal one of the central problems of environmental finance: nature does not operate on a centrally controlled basis.

I am not arguing that the authors suggest turning the clock back to the age of empires as a solution to the environmental, social, and financial crises we face today. But I am suggesting that the continuing reliance on mechanical metrics and control systems overlooks one of the fundamental attributes of cultures that experience a high quality of life: natural integration and love for nature, rather than control over it, no matter the stated purpose.

With that said, let's take a look at the basic arguments of the paper and contrast them with global corporate business as usual. The central thesis of the paper explaining its title is contained in the opening thought from Clements-Hunt:

> *For a more stable and resilient financial system, all public and private actors involved in the investment and financial intermediation chains will benefit from the use of wider and better quality "lenses" that give greater depth, breadth and granularity to our vision and understanding of a wider range of risks. Also, those same market actors should employ "clocks" that heighten their appreciation of the temporal nature of risk by neither over-emphasizing those short-term and apparently more easily quantifiable risks nor under-emphasizing the slow, creeping risks that destroy value over the long term.*

Although it bears the bureaucratic weight of noncontroversial language in its tone, this statement is characteristic of UNEP FI's remarks: philosophically sound and welcoming to the ears of civil society, if politically bland. For the politically charged remarks, Clements-Hunt relies upon his friend the Right Honourable Gordon Brown, Scottish statesman and former British prime minister. The close relationship between the two friends was

highlighted similarly at last year's UNEP FI Global Roundtable in Washington, DC, where Clements-Hunt presided, and Brown provided the politically charged keynote address.

Brown doesn't disappoint in this paper, dredging up another iconic figure of history:

> *History tells us that communities, companies and markets only flourish in the long term when they are underpinned by shared values that promote stability. Through the centuries it has become clear that values build value and morals make markets. Seventeen years before* The Wealth of Nations*, the great Scottish philosopher, Adam Smith, gave us* The Theory of Moral Sentiments*. The moral compass Smith provided for the markets in the 18th century will enable us to steer a better course in the global markets of today.*

From the stage in DC last year, Brown did a remarkable job illuminating Adam Smith's life. A fellow Scot, Brown went to great lengths to paint a picture of Smith's seaside village and the importance of global trade to its success. None of this was particularly surprising, but Brown's real effort was to persuade the audience that Smith's *The Theory of Moral Sentiments* was the guiding light for *The Wealth of Nations*, and that the "free markets" of the world, based as they are upon Smith's "Invisible Hand," must not and cannot be divorced from moral sentiment. It is this Dickensian view of the social philosophers, from Adam Smith and John Maynard Keynes to Gordon Brown, that again provides hope for a world drowned by the high frequency, militaristic techno-economics of America and the G20. Indeed, the words of Clements-Hunt, Brown, and their colleagues remind us of the great quote by Edmund Burke: "The age of chivalry is gone. That of sophisters, economists and calculators has succeeded; and the glory of [that world] is extinguished forever."

Why do I spend so much time on the subliminal effect of this paper? Because the first casualty of modern economics is moral spirit. Lenses, clocks, mechanics, technology, economics; these tools of humankind have become masters, and before we determine how to measure our progress, we need to determine exactly where we wish to go, and what we desire to accomplish. Neither lens nor clock can tell us which way lies our heart's content, nor that of our loved ones in family, village, or nature. And so, although the paper does not explicitly discuss these subjects, the time tunnel presence of Big Ben, Brown's morals and values discussion, and a few other hints and cues here and there let the readers know that they are in the company of friends.

I hope this review will inspire readers to take a glance at the formal, systemic recommendations of the paper, many of which are very good. However, I will not provide an exhaustive inventory. The report lists six primary areas of engagement, with a focus on overcoming "short-termism" and a singular emphasis on financial performance inherent in all of them.

Here I name the six areas explored and provide a brief citation from each section (boldface emphasis within quotations is mine):

Dark Pools and the Shadow Side: Stability and Over-the-Counter Markets. "The clearest link between trading activities, OTC markets and derivatives with sustainable development is the systemic risk that **instability in capital markets poses potentially for balanced long-term economic, social and environmental development**."

Ownership That Counts: Institutional Investors and Accountability. "Since publication of the Freshfields Report in October 2005, there has been a development of 'soft law' across various jurisdictions that highlights a clear and developing trend whereby a consideration of broader risk issues by investors, including environmental, social and governance (ESG) considerations, is **not just permissible but in many cases is obligated**. In the case of institutional investors and the subprime collapse that led to the financial crisis, many questions surrounding the governance of banks in which they invested, including policies and practices regarding the fundamentals of risk management at the institutional and systemic levels, **appear to have gone unasked at worst and raised but not pressed at best**."

Listing for Stability: Stock Exchanges and Listing Requirements. "In November 2009, the UN Secretary-General, Ban Ki-moon, addressing an event exploring sustainable stock exchanges in New York, told the event: 'Stock exchanges and other financial bodies have a key role to play. Many of you have taken important steps to advance this agenda. **I welcome your efforts to incorporate ESG issues into new stock exchange indices, listing rules and regulatory frameworks**.' Subsequently, and in the run up to the United Nations Rio+20 Summit to be convened in Rio de Janeiro, Brazil, in June 2012, a broad global coalition of investor and civil society groups are backing the idea of a protocol to promote more effective corporate sustainability reporting to enhance information and data flowing into markets concerning ESG issues."

Banking Risk for the Long Term: Systemic Risk and the Basel Committee. "The banking supervisory community might argue that there is ample scope to consider sustainability risk issues within the existing BCBS [Basel Committee on Banking Supervision] parameters and that such risk is actually already factored into the Committee's well structured deliberations. Equally, the sustainability community might contend that rapid acceleration in public policy, legislative and regulatory **efforts to quantify sustainability risk and see them embedded in the markets normal assessment, pricing and accounting standards** means that they deserve a specific focus within both the structural (macro prudential) and operational (micro prudential) considerations of BCBS."

Rating Right: The Role of Rating Agencies with the Financial System. "When questioned on the potential conflicts of interest inherent in the 'issuer pays' business model of the CRAs [Credit Rating Agencies], the raters have traditionally contended that the importance of their brand independence and the accuracy of their ratings act as an efficient internal regulator. **Questions raised around CRA performance in the run up to and during the financial crisis have placed this argument under pressure**."

Insuring the Future: Stability and Solvency II. This section is more robust than the previous five, and includes a discussion of Solvency I and II, as well as the Sustainable Insurance Initiative. Perhaps it is best summarized with this editorial: "The insurance industry has long been in the vanguard of understanding and managing risk and has served as an important early warning system for society by amplifying risk signals. Through loss prevention and mitigation, by sharing risks over many shoulders, and as major investors, the insurance industry has protected society, catalyzed financing and investment, shaped markets and underpinned economic development. The global risk landscape is rapidly changing and global ESG factors require new risk management and financing approaches. **Given their multiple roles as risk managers, risk carriers and institutional investors, insurance companies have immense capacity to understand and manage ESG factors**."

The paper's final four recommendations are also worth listing:

> *Proposition 1: Build a deeper understanding of how policy-makers, market regulators and international financing institutions can support the growth and mainstreaming of responsible investment and inclusive finance approaches. Examine, identify, assess and replicate how innovative approaches can be scaled and accelerated to have a direct impact on meeting basic needs and supporting sustainability. . . .*

Proposition 2: Establish a monitoring body, which ensures that our global financial architecture is managed on sustainable fiduciary principles. The initiative will identify where there are flaws in the architecture, and advocate solutions. . . .

Proposition 3: Investigate why long-term pension investment has not resulted in a financial system that more obviously serves the interests of savers and supports global sustainability. . . .

Proposition 4: Build on the work of the Integrated Reporting Committee and others to promote transparency in the operations of financial and commercial organizations. This should include ensuring the principles upon which reports are based are sound and sustainable, and that those who provide such information are independent and that it is properly reported.

"Such a Tide as Moving Seems Asleep": A Review of Seven Books That Attempt to Awaken It

Reviewed by Ron Nahser, PhD, Senior Wicklander Fellow, Institute for Business and Professional Ethics, DePaul University

In the previous issue of the *JEI* (3, No. 1, 2012[*]), Angelo Calvello, editor in chief, titled his comments: "Such a Tide as Moving Seems Asleep"; a line taken from Tennyson's famous poem: "Crossing the Bar." (Thanks, Google.) Dr. Calvello used the provocative image as a metaphor to make the point that the movement to environmental investing has been unexpectedly slow despite "robust environmental investment ideas and opportunities that offer to give return per unit of risk." He goes on to say that there is not the political will to create the government policies necessary to encourage this kind of investment.

Every system—and environmental investing is certainly a part of a very large and complicated one—has various leverage points or fulcrums for change. Governmental policy is one such leverage point, and as Dr. Calvello suggests, you need the political will to support the crafting and passing of various government regulations. **However, the premise for this book-review essay is that *social* will—based on logic, norms, beliefs, concerns, and arguments—does and must precede and shape the political will.**

What more vivid example of this do you need than Governor Romney's acceptance speech in Tampa when he mocked the 2008 acceptance speech of President Obama who promised to "slow the rise in the oceans and to heal the planet." Romney went on to say that in contrast "my promise is to help you and your family." (This got the loudest applause of the night.) Whatever your political persuasion, as a reader of this Journal, those comments had to strike you as to how big a gap in logic we have to bridge in order to drive political will. And your work as environmental investors can provide such a bridge.

Inspired by the structure of classical liberal arts curricula—the ancient *Trivium* and *Quadrivium*—I have chosen seven books published in 2012 that I thought might be of interest to the creative readers of the *JEI*: starting with specifics of building infrastructure and then moving to larger perspectives of finance, capitalism, philosophy, science and finishing with a broad survey book. The goal is not to summarize or critique them. Rather, the purpose is to search and see if we can hear any voices, themes, ideas, arguments, logic, or "memes" (as the semantic and rhetoric scholars call clustering of ideas in short phrases

[*] http://thejei.com/index.php/JEI/article/view/144

or words) that might indicate ways of awakening the "tide": the consciousness/ knowledge/logic/language connecting the environment with the economy, and the financial function. To conclude, and as a timely checkpoint, I will mention a book published in 2009—just after the 2008 U.S. election.

We begin with a book of immediate relevance: how to determine the needs for infrastructure.

Brett M. Frischmann—*Infrastructure: The Social Value of Shared Resources*

The author, an attorney specializing in IP and information law, immediately makes a valuable contribution with his choice of a starting point. Rather than addressing the problem of ensuring an adequate *supply* of infrastructure, he asks the basic, but often overlooked, blazingly obvious question from the *demand* side: "How do we determine what infrastructure resources the market really needs?" He begins with a cogent explanation about infrastructure resources as *commons* and ways of managing infrastructure, which to many *JEI* readers will be a useful review of familiar ground. He then looks at the infrastructure of four sectors: transportation, communication and telecommunications, the natural environment, and intellectual property. It is a technical book full of useful perspectives and ideas, particularly from a legal standpoint.

I found the way he treated the larger issues in context of the commons to be very encouraging. But as he got into detail on the marginal cost controversy concerning trade-offs (for example, Coase et al., as to whether there should be regulation or not), I found that his perspective narrowed, . . . which is exactly the opposite of what many of us think we need to drive social will. For example, he talks about these big issues with sentences like this: "I have reservations about over reliance on ecosystem valuation as a tool to guide regulatory policy."

OK, so don't we all, but we need to address it and wrestle with it.

Another example of his perspective narrowing is where he is questioning policy on transportation infrastructure, again ducking the big issue by carefully/lawyerly saying: "The social cost of environmental pollution and other environmental impacts from road infrastructure must be taken into account and may suggest that there are decreasing returns at certain levels of infrastructure use in certain contexts. Whether the environmental costs of road transport tip the scales and render alternative modes of transport more attractive from a social welfare perspective is an important issue, one that I do not attempt to resolve here."

And when referencing the intersections of various versions of intergenerational ethics in fairness to future generations, he summarily says: "I leave exploration of such approaches for another day."

No, no, maybe you don't want to explore them today, but these are exactly the critical, bigger questions that must be addressed . . . today.

So, to find help in broadening the context to give perspective vital to making investment decisions, we now move to the view of the financial industry and its role in shaping social norms.

Robert J. Shiller—*Finance and the Good Society*

What a promising title: Shiller is coming to the defense of the financial industry after the 2008 financial crisis. His basic premise is not to be an apologist for the sins of finance, but to argue that we really need to reclaim and expand finance for the common good. His credentials are impressive: he predicted the stock market bubble of 2000 and the decades-long run-up to the 2008 real estate bubble. In his three-decades career of teaching finance at Yale—many of his courses are available online—he has come to believe passionately in the power of economics and what he calls financial capitalism, meaning that we need more finance, not less.

Part One of the book is devoted to succinctly outlining the "Roles and Responsibilities" of the players in the financial crisis—18 characters/chapters in all. Part Two, entitled "Finance and Its Discontent," is where he looks at various aspects of the performance of these characters, ideas, and dilemmas that drive financial crises. Then in his brilliant and rousing concluding chapters, we find out what he has been really driving at: the *democratization* and *humanization* of finance.

Just what is the power of finance for the "Good Society"? Well, for starters, how about its role in fostering peace. Shiller recalls a theory presented in 1910: "It is an illusion that military conquest brings economic advantage." People at the time ridiculed the idea—war was a part of human nature . . . and this was just before World War I. (The author of the theory, Norman Angell, later won the Nobel Peace Prize.) As a simple support for Angell's premise, Shiller mentions a study done recently on the incidence of war that shows an inverse relationship between the level of financial interconnectedness, namely capital flow between countries, and the likelihood that those countries will go to war.

Shiller concludes that financial capitalism could/must play the same role in the crises facing us today. While he doesn't specifically address the environmental crisis, he ends

with a uplifting thought for the fundamental need to *humanize* finance, citing for support such contemporary ideas of how the human mind works as indicated by the rise of behavioral economics and neural economics—the subject we will turn to in Wilson's book. Shiller then calls on no less an authority than Adam Smith and his precise rendering of *praiseworthiness* as the ultimate motive for humanizing financial and economic behavior: "Adjusting our own character and conduct according to those measures and rules by which esteem and approbation are naturally bestowed." In other words, it is not how I feel about myself, but how others see and evaluate me.

This seemingly soft/qualitative distinction gets reinforcement and elaboration from an unlikely source, the author of our next book, who is a noted finance professor at the University of Chicago's Booth School of Business—a place not known for its soft/qualitative reasoning.

Luigi Zingales—*A Capitalism for the People: Recapturing the Lost Genius of American Prosperity*

From the title, it might sound like a socialist-leaning treatise; it is actually quite the opposite. Zingales signals right at the beginning that he will base his view of American economics and finance on his personal story and experience. He came to this country as a graduate student to get away from the cronyism and nepotism that he saw a rampant in Italy. But what he has seen and observed in his now decades-long involvement at the University of Chicago and while studying financial markets and governance is that we are in danger of losing this great foundation of markets, which is freedom.

The manifestation of freedom that makes markets run is, in his mind, competition. He credits Adam Smith with the great insight that the wealth of nations comes from competition. But he also rightly comments that Smith believed in moral sentiments and the power of virtue in driving and providing the context of this competition—for the approval of their virtue. Here he picks up, with great effect and telling detail, Shiller's theme of the need for praiseworthiness, but from the point of view of tolerating bad behavior and resurrecting the ancient idea of shame for that behavior.

The book's essence is captured in the title of chapter 3, "Crony Capitalism American-style," as exemplified by lobbyists and big business. While in many chapters Zingales covers topics that will not be of direct interest to those concerned with markets for financial instruments in the environmental space, he adds to the argument that I have attempted to outline in these reviews: that we need to have a change in what he calls the "importance of social norms" in addition to official rules. These social norms need to be

shaped and based on, rigorous analysis and the data, which are roles for academic economists as well as all readers of the *JEI*.

Zingales's work is about dispersing power and access to capitalism to many people. But to further support that perspective, we will take a brief look at what happens when we take the opposite tack and give more power to big government and bureaucracies.

Alan H. Meltzer—*Why Capitalism?*

If you want a realpolitik view of the world, Meltzer's your guy. You know right away that you are in for quite a ride when, in the introduction, he acknowledges the range of his influences, from Immanuel Kant (for example, human nature as "crooked timber") to Karl Popper to Friedrich Hayek, and to Milton Friedman, among others. He takes you back in time and sketches from a broad perspective the old battle of capitalism versus communism and socialism, and extols the genius of the freedom of capitalism. Calling on Kant, he recognizes the imperfections of human nature, which must be allowed to work themselves out in a competitive marketplace, rather than appealing to utopian visions. He makes the case that social justice can be achieved not by severely regulating capitalism, but by having it work itself out in the marketplace, and with citizens able to judge the results and make changes accordingly.

For those interested in recounting the perils of government regulation and failed attempts at income distribution, it's a treasure, especially in the last chapter. There, the author describes the role of the Federal Reserve, particularly in moderating inflation, Meltzer's specialty.

Having set out the problems of large institutions attempting to control our flawed nature, we leave the perspectives of finance and turn to three books in the liberal arts and sciences traditions—first to philosophy—for comments about the local community as ways to harness our individualist motives.

Roger Scruton—*How to Think Seriously About the Planet: The Case for an Environmental Conservatism*

While Scruton and Meltzer share a profound distrust of big government and business, Scruton looks for solutions in the opposite direction. He focuses on the power and interests of small communities gathered together to care for their local environment—what he creatively calls "oikophilia." To get to this more humanistic framing of the environmental problem, he states halfway through the book: "More simply put, environmental problems are problems of morality, not economics."

Specifically, he states that we are not governed strictly by cost/benefit analysis. Yet even when this quantitative perspective shapes our reflection, we take into account the costs/benefits to others. In moral reasoning, we are looking deeply into the sources of human motivation and at the things that cannot be traded. Yes, we are capable of rational sacrifices.

He identifies the many ways—using projects in his UK homeland as his evidence—in which local groups of ordinary citizens, often with limited power, spontaneously apply social pressures and effect environmental changes in order to maintain a sustainable equilibrium. Following Meltzer, he shows how state initiatives in the form of subsidies and regulations often destroy what they aim to protect, because they hinder the major advantage of markets to provide feedback: a homeostatic system that adjusts in response to negative feedback when things go wrong.

While there is much more in his elegantly constructed argument of linking conservative thought with concern for the environment, we will conclude with his comments about evolutionary psychology, following the familiar model/dilemma of instinct versus reason driving behavior. He comes down on the side of reason: the sources and purpose of such sentiments as "guilt, shame, the love of beauty, and the sense of justice which arise from reason itself, and reflect the web of interpersonal relations and understandings through which we situate ourselves as free subjects, in a community of others like ourselves."

This line of reasoning leads to Scruton's deciding factor "full of persuasive force…*oikophilia*, the love of home, a motive that comprehends all our deepest attachments, and which spills out in the moral, aesthetic and spiritual emotions that transfigure our world, creating in the midst of our emergencies as shelter that future generations also may enjoy."

We would expect Scruton, as a philosopher examining evolutionary psychology, to favor reason over instinctive motives. Before we examine the competing field of instinctive motives, we will take another look at rational motives driving our behavior, particularly in economics, and addressing a fundamental question: Do markets encourage a sense of justice and concern as Scruton, Meltzer and Zingales suggest? That is the question the distinguished Harvard professor and scholar of justice Michael Sandel asks.

Michael Sandel—*What Money Can't Buy: The Moral Limits of Markets*

At some point in your career, as a reader of the *JEI,* you obviously saw that developing financial instruments for investing in environmental projects was a great idea. Clearly, you were attempting to harness the strength of capitalism as a way of providing financial

motivation to protect the environment. What could be more indicative of American economic logic than that? Michael Sandel—author of the only book reviewed here to be a finalist for the Financial Times and Goldman Sachs Business Book of the Year Award—asks you to stop and reconsider: By commoditizing something valuable, such as nature, are you diminishing and crowding out higher motives for action, such as civic pride and concern for the common good?

Before you quickly say, "that's exactly the reason why I'm doing what I do," consider some of his examples, such as in sports. He follows the trajectory and amount of money that has poured into baseball over the decades as the huge stadium-branding and skybox mentality, which he contends diminishes the community spirit of the game. And what about paying children to get good grades? Or closer to home for our purposes, what about cap and trade schemes? He cleverly compares these to bribes and indulgences, used to pay for the sins we shouldn't have committed in the first place.

But how can we help to broaden the perspective from a narrow focus on maximizing returns to shareholders alone (so-called "agency theory") and connect financial capitalism to the larger sense of the common good? Difficult? Impossible? Does it go against human nature—the familiar economic rationalist? An unlikely source of hope comes from evolutionary biology.

E.O. Wilson—*The Social Conquest of Earth*

Why would we be interested in evolutionary theory? Well, if there ever was an example of a "tide" of thought always awake and on the move, we can do no better than to look at the ways in which science develops. We have witnessed, especially since the Enlightenment, the familiar pattern of a theory emerging from data, but then more data come to help form new theories, often triggering a revolution of thought. (Think of the revolution the theory of evolution caused.)

Our focus on the theory of social norms often rests on and is reduced to the familiar *Homo Economicus*—the rational optimizer who translates all transactions into what is in his or her immediate best self-interest. Support is often drawn for this characterization from the evidence of evolution. Isn't that how we survived the jungles of nature, red in tooth and claw? Get the government out of the way and let the struggle in the market determine winners and losers. Any evidence of altruism, as Romney indicated, extends to us and our families. In evolutionary terms, it is called the "kin theory," or "we take care of our own."

Wilson himself for many years subscribed to this theory of kinship selection as the key dynamical force in human evolution. But growing evidence changed his mind to show a

much more complex process. (By the way, he has taken quite a hammering from fellow scientists—tides in science are often hard to "awaken.") And he got his answer from studying Hymenoptera—the class of insects, including ants, wasps, and bees. To oversimplify, scientists observed that insects have both individual survival instincts as well as instincts that the entire tribe needs to survive, and he called this *eusociality*. We might say this is the ability of individual members of a species—Homo sapiens—to hold *both* themselves and their families *and* the planet and oceans in mind.

Even more surprising, scientists have determined that while any member of a colony of Hymenoptera have all the genes to fill any role from Queen to worker, they brought out only those that were necessary to fulfill their particular role. These genes are called *epigenes*. If we are looking for a biological explanation of our behavior, this is a useful model—we activate or suppress different motivations, pending the context and the need. Wilson outlines strategies in the scheme of complex, closely calibrated motivations: "altruism, cooperation, competition, dominance, reciprocity, defection, and deceit." For instance, are you, readers of the *JEI* really the good guys and the saviors of the crashing environment and the solvers of the environmental problems all around us, or are you just the latest pillagers and plunderers of society looking to make a buck? Or both?

Applying the theory of epigenes and eusociality, we are wired to behave in all these ways, but, unlike the Hymenoptera, we can choose! While you don't have to believe that *nature* drives us all, it is good to know that biological evolution does support altruism. So the function of *nurture* has something profound to build on.

This altruistic division of labor was a major innovation in the history of life and is quite rare. We seem to be the only vertebrates who exhibit it. Even our close relatives, like the Neanderthals with their larger brain capacity, give no evidence of having it, which could explain, Wilson believes, why we puny species survived against overwhelming odds. So you, *JEI* readers, might just think of yourselves as the next step in evolution to connect individual self-serving motives with serving the common good. You can be the educators who show how to bridge Romney's dualism by connecting concern for the environment and concern for the individual and family.

Conclusion

As I warned in the introduction, this has been a winding journey through a broad landscape of seven thoughtful books published in 2012, with the purpose of looking for hopeful signs of language and arguments to help us awaken the tide of social opinion to drive political will and action. What did you find? What arguments, logic, ideas or themes

struck you, challenge your beliefs and help you think anew. How might you put your new ideas and strategies into action?

The readers of the *JEI* have a unique responsibility and opportunity to craft the investment stories as part of the larger story to help us all think like socially and environmentally aware financial capitalists, always realizing as we make our investment decisions that: "the economy is a wholly-owned subsidiary of the environment, not the other way around." (Senator Gaylord Nelson, Democrat from Wisconsin)

It looks like it is going to be a long struggle. To give you pause for thought on the movement of the tide and to serve as a benchmark just after the 2012 election, in a noteworthy book published in 2009 as advice for President-elect Obama—*Down to the Wire: Confronting Climate Collapse*—David Orr compares the movement to embrace the environmental cause as similar to the long and torturous path to end slavery. And just as Americans finally faced the moral principle that slavery was wrong, he sees evidence today that the great turning in human attitudes and behavior has begun. And with the re-election of President Obama, Orr's advice still holds.

The time and scope perspective referred to by Orr gives more urgency and hope to Dr. Calvello's concluding sentence in his essay: "We continue to swim on, buoyed by the work and action of a dedicated, thoughtful group and hopeful that the tide will soon turn."

It is to feed that spirit of creativity and courage that these book reviews are offered.

Acknowledgments

Dr. Nahser wishes to acknowledge the editors of the *Financial Times* for continuing to provide models of clear and succinct book review writing and, in particular, Harry Eyres and his column, "Conservation and Conservatism." http://www.ft.com/intl/cms/s/2/cf805d98-fc16-11e1-af33-00144feabdc0.html#axzz27y7pNDh7

Bibliography

Frischmann, Brett M. 2012. *Infrastructure: The Social Value of Shared Resources*. New York: Oxford University Press, 436 pp., $85 (hardback), $35 (paperback available December 2012).

Meltzer, Allan H. 2012. *Why Capitalism?* New York: Oxford University Press, 168 pp., $21.95 (hardback).

Orr, David W. 2012. *Down to the Wire: Confronting Climate Collapse*. Reprint. New York: Oxford University Press, 288 pp., $19.95 (hardback), $15.95 (paperback).

Sandel, Michael J. 2012. *What Money Can't Buy: The Moral Limits of Markets*. First edition. New York: Farrar, Straus and Giroux, 256 pp., $27 (hardcover), $12.99 (eBook), $17.99 (audiobook), $29.99 (compact disc).

Scruton, Roger. 2012. *How to Think Seriously About the Planet: The Case for an Environmental Conservatism*. New York: Oxford University Press, 464 pp., $29.95 (hardback).

Shiller, Robert J. 2012. *Finance and the Good Society*. Princeton, NJ, and Woodstock, Oxfordshire, UK: Princeton University Press. 304 pp., $24.95/ £16.95 (cloth), $24.95 (eBook).
Wilson, Edward O. 2012. *The Social Conquest of Earth*. First edition. New York: Liveright Publishing Corporation, 352 pp., $27.95 (hardcover), $17.95 (paperback).

Zingales, Luigi. 2012. *A Capitalism for the People: Recapturing the Lost Genius of American Prosperity*. New York: Basic Books, 310 pp., $27.99 (hardcover).

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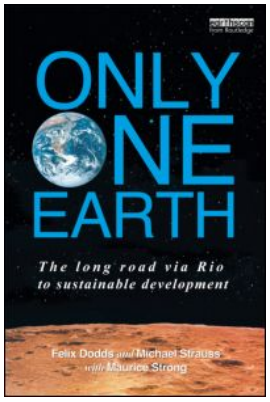
Book Review



Only One Earth: The Long Road via Rio to Sustainable Development by Felix Dodds and Michael Strauss with Maurice Strong; London and New York: Routledge, 2012, 312 pp., $44.95 (hardback and eBook)

Reviewed by Adam Seitchik, PhD, CFA

The existential environmental risks we face are by definition global: sea level rise, biodiversity loss, and the poisoning of the air and the oceans. Yet for many of Earth's seven billion citizens, the daily weight of poverty, hunger, disease, and insecurity overshadow these longer-term risks. The well-traveled road for the lucky few who have emerged from poverty to affluence has been one of resource-intensive, polluting industrial capitalism, creating what often seems like an insurmountable tension between true ecosystem sustainability on the one hand, and human needs and aspirations on the other.

The UN is where the rich global North meets the rapidly developing South to square this thorny circle. And thus was born the holy grail of "sustainable development," the now 40-year-old effort to imagine a socio-economic system that meets both the earth's requirements and humanity's needs. This review summarizes international sustainable development initiatives as documented in the recently published *Only One Earth*, and offers a few reflections on the book itself.

The catalyst for global sustainable development was the modern environmental movement, including Rachel Carson's early warnings about the synthetic pesticide DDT, increasing concerns about unchecked population growth, and criticism of crass materialism in the post-war period of American consumerism. From a starting point of 1.61 billion persons at the beginning of the 20th century, the earth's population had more than doubled to 3.5 billion by 1968. In that year, the Swedish government introduced a resolution in the UN General Assembly to convene the first world conference on the environment, which led to the 1972 UN Conference on the Human Environment in Stockholm.

In advance of the Stockholm Conference, the UN commissioned a report entitled *Only One Earth*, which became the rallying cry of the conference as well as this book's title. The authors witnessed and participated in UN sustainable development initiatives from the beginning. Their work continued over the subsequent 40 years, with Maurice Strong serving as Secretary-General of the UN conferences both in Stockholm and, 20 years later, at the iconic Earth Summit in Rio. This on-the-ground experience gives the authors deep first-hand knowledge of the events described, as well as perspective on the achievements and challenges of transitioning from metastasized industrial capitalism to a truly sustainable economy.

Identifying solutions to thorny problems can be much less challenging than implementing them. The 27 principles of the 1972 Stockholm Declaration and the 109 recommendations in the action plan covered much of the current sustainability agenda, from "climate modification" to marine pollution. They also identified the core tension in sustainability versus development, as there was language to ensure that environmental standards did not become pretexts to limit trade or impose barriers against imports from the developing world. The Stockholm recommendations also included studying the additional costs to developing countries arising from environmental considerations.

The authors note that the Stockholm conference was in many ways "the birth of the environment movement worldwide, whether it's Greenpeace, Friends of the Earth, Earth Day, UNEP, US EPA and other EPAs, the creation of environment ministers in government, and environmental journalism; it all started around the same time as the conference" (p. 14).

The founding of the United Nations Environmental Program, or UNEP, was a case study in the concerns of the developed world that environmentalism would impede trade and commerce:

> *The organizational capacity of the new programme was kept weak. A group of countries which supported its establishment, including Britain, the US, Germany, Italy, Belgium, the Netherlands and France, had agreed secretly to ensure that it would not have the support required. The group was concerned that any new environmental regulations would have an impact on trade. They also wanted to ensure that UNEP did not have a large budget as it would then be restricted on what it could do.* (p. 16)

For political reasons, UNEP was established in Kenya, which limited the program's ability to integrate with other UN agencies. Nevertheless, over the subsequent 20 years, a number of multilateral agreements were struck in six thematic clusters—oceans and regional seas,

freshwater, biodiversity, atmosphere, land, and chemicals and hazardous wastes—and often led to distinct programs dispersed around the world. This fractured environmental governance system further limited the ability of UNEP to be at the hub of the world's efforts to develop sustainably.

In 1982 the Canadian government called for a special commission to look at "long-term environmental strategies for achieving sustainable development to the year 2000 and beyond." This led the UN General Assembly to establish the World Commission on Environment and Development, chaired by former Norwegian Prime Minister Brundtland. The Commission's ground-breaking 1987 "Brundtland" report "would provide the conceptual and political framework for integrating a vast panoply of ecological, social, economic, participation, governance, and even lifestyle issues—and for changing the way governments and average individuals looked at their planet and its possibilities for its future development" (p. 24).

That is quite a mandate. The Brundtland report's definition of sustainable development, though not explicit in terms of our environmental imperatives, has remained popular over the ensuing 25 years:

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

The Commission's greatest legacy was to call for an international convention on environmental protection and sustainable development, what would come to be known as the "Earth Summit," in Rio de Janeiro in 1992. The Rio organizers (with Maurice Strong at the helm) understood that sustainable systems require full democratic participation, and consequently Rio became one of the most diverse gatherings of global stakeholders that the world has ever seen. In the year leading up to the conference, multiple global stakeholder networks convened to provide input to and prepare for Rio. One of the key organizers of the Conference, Chip Linder, stressed the importance of consensus building through broad participation:

> *We have to find a way to move from confrontation through dialogue to cooperation; and we have to get all the players at the table. It is no longer good enough to be critical. Each of us has to accept a share of the responsibility to do something. And we all have to have the humility to recognize that our solutions are not necessarily the only ones or ultimately the right ones. The world works inter-relatedly and we have to work inter-relatedly.* (p. 31)

The breadth of attendees at Rio was unprecedented, gathered inside a vast aircraft hangar that became known as "Riocentro." Of the 178 nations attending, 108 sent their heads of state or government—the largest number ever to attend a UN conference or summit. Official attendees included 2,400 representatives of NGOs and roughly 10,000 journalists from around the world. A highly organized concurrent "Global Forum" in Flamenco Park attracted somewhere between 35,000 and 50,000 stakeholders. This Forum amounted to a 10-day "international environmental graduate seminar and cultural festival" which, along with the thousands of articles and broadcasts from Rio, put sustainable development on the global stage like never before.

Out of this vast convening, came the Rio Declaration on Environment and Development as well as Agenda 21, a 40-chapter blueprint for action in the 21st century. The UN Commission on Sustainable Development, the Convention on Biological Diversity, the Framework Convention on Climate Change, and the Forest Principles were all born at Rio.

Agenda 21 represents a near-complete blueprint for a sustainable future, reflecting what the authors' call "a global consensus and political commitment at the highest level of government on development and environmental cooperation" (p. 36). But the nature of that commitment is not at all clear, as these are not treaty agreements but "soft laws" that carry the legal weight of a global group hug.

In virtually all countries other than the United States, at least when a head of government commits to something, they generally have the power to turn that commitment into law. But in ways that are often not well understood globally, the U.S. president as head of state does not truly speak for his or her country: Congress has the final say. And it has become rare for the president to have effective control of both houses of Congress, including the 60 votes necessary in the Senate to overcome a filibuster. This impedes the ability of U.S. leaders to fulfill soft commitments like Rio, even under sustainable development-friendly presidents such as Bill Clinton and Barack Obama (who might disagree with former president Bush senior that "the American way of life is non-negotiable").

Global environmental crises are a product of the industrial age, and thus were not part of "Agenda 1787," otherwise known as the U.S. Constitution. The framers were interested in limiting national power in the service of individual citizens and smaller U.S. states, not to benefit the community of nations. The rise of the political right over the last three decades and today's gridlocked politics keep the United States from reaching any kind of national environmental consensus that resonates with the rest of the world, so the task of integrating into a progressive global program like Agenda 21 seems all the more daunting.

We have seen some limited progress in the 20 years since Rio. The total global population continues to expand by more than 80 million persons per year, but world fertility rates have declined from around 4.5 births per woman at the time of the 1972 Stockholm conference, to 3.1 at the time of Rio, to less than 2.5 births today.

The UN's Millennium Development Goals (MDGs), created during the economically flush period leading up to the turn of this century, attempted to catalyze action around specific sustainable development targets over the subsequent two decades. This year's UN report on progress towards the goals highlights improvements in human conditions (United Nations, *The Millennium Development Goals Report 2012*). However, social and economic achievements have outpaced environmental progress, as our global development model seems less environmentally sustainable with each year:

> *The target of reducing extreme poverty by half has been reached five years ahead of the 2015 deadline, as has the target of halving the proportion of people who lack dependable access to improved sources of drinking water. Conditions for more than 200 million people living in slums have been ameliorated—double the 2020 target. Primary school enrollment of girls equaled that of boys, and we have seen accelerating progress in reducing child and maternal mortality . . . biodiversity loss continues apace, and greenhouse gas emissions continue to pose a major threat to people and ecosystems.* (UN, *MDG Report 2012,* 3)

The goals of environmental sustainability identified in the MDG are to "Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources… [and achieve] a significant reduction in the rate of [biodiversity] loss." The report on progress is sobering in our inability to develop sustainably in the first decade of the new century: loss of global forest area (though slowed a bit from the prior decade) and a 39% increase in global $C0_2$ emissions. And while there has been an increase in the number of environmentally protected areas,

> *A substantial proportion of species in all taxonomic groups examined to date are threatened with extinction, ranging from 13 per cent in birds to 63 per cent in cycads, a group of rare plants that have remained unchanged for millions of years. Worse still, in those groups for which trends in extinction risk can be quantified, many more species are deteriorating in status than are improving.* (UN, *MDG Report 2012,* 52)

The authors summarize a status review commissioned by the UN on the implementation of the Rio Declaration and the detailed Agenda 21. Perhaps the greatest single success has been the management of toxic chemicals, including the EU REACH legislation—"hard law" that is forcing real change in the chemicals industry. A related major achievement

has been the near-elimination of ozone-depleting emissions, first in the developed and now in the developing world. In most other areas covered by Agenda 21, there has been some limited progress but we remain far from the lofty targets identified at the Earth Summit 20 years ago.

Beyond this "implementation gap," the authors document critical needs for reform in governance, economics, financial markets, and democratic participation. They conclude with a 21-point "survival agenda" to help save the planet. One of the most promising reforms advocated is the creation of an overarching World Environmental Organization, which would be in part modeled on and serve as a counterweight to the powerful World Trade Organization. Though the analysis is clear, the lack of an implementation strategy speaks to the limits of coordinated global environmental action that the book documents so well.

The recently completed "Rio+20" Conference modernized the rhetoric of sustainable development by focusing on the green economy. The authors see benefits in this evolution:

> *While use of the phrase 'sustainable development' (and 'sustainable production and consumption') has been hindered by accusations from some rigidly pro-business advocates and the political right that it will intentionally limit growth . . . the phrase 'green economy' evokes an open, environment-friendly, people-friendly and business-friendly reaction.* (p. 252)

In practice, however, the "green economy" program articulated by the authors is identical in kind to the agendas of Stockholm, Rio, and the Millennium Development Goals: transitioning to a form of development that is environmentally sustainable. Certainly, citizen and consumer environmental awareness has improved significantly in the 40 years since Stockholm. It is encouraging that many corporations are now analyzing the risks and opportunities laden in their strategies toward the environment, society, and their own governance (so-called "ESG" issues). Institutional investors are increasingly aware of the materiality of these issues for the long-term performance of their portfolios. Yet environmental degradation continues as the ever-expanding population of global consumers remains tethered to the sclerotic model of extractive industrial capitalism, unable to embrace a full-scale evolution to a truly sustainable human footprint.

Only One Earth provides valuable documentation of the global effort to achieve sustainable development, from Stockholm all the way to the preparations for the 2012 Rio+20 conference. An important reference document, this is no summer beach read: the list of over 160 abbreviations runs from ACC (the Administrative Committee on

Coordination) to ZPG (Zero Population Growth). The UN remains one of the most complex bureaucracies on the planet and progress can only be measured in decades, not years. The work of global environmental governance, while incredibly challenging, is also vitally important. This useful, meticulously detailed compendium contains the wisdom of

40 years of first-hand experience, documenting where we have come from and what is still required to achieve a globally cooperative and environmentally viable prosperity.

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