

A R T I C L E S

The New Wild West Is Green: Carbon Offset Markets, Transactions, and Providers

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Executive Overview

We undertook an evidence-based study of 117 carbon offset providers from eight countries. From this study we contribute a conceptualization of venture performance and an agenda for research in this important domain. Our findings show how additionality (i.e., project feasibility without external funding), certification, standards, prices, and transparency distinguish the best carbon offset providers. We lay a foundation for understanding venture strategy formulation, market entry, and competition in these unregulated and volatile organizational environments. As sustainability and environmental issues continue to influence activities in the business world, understanding the issues we delineate in this paper becomes more important for management scholars and practitioners.

As a research area, carbon offsetting offers an unparalleled context for appreciating the balance between environmental concerns and business and economic development. Carbon offsets are allowances that represent one unit of carbon dioxide emissions that are linked to climate change. The unit is usually measured as a metric ton, or 2,205 pounds. Carbon offset providers sell these allowances to customers who are interested in carbon emissions reductions, and the sales revenues are used to finance carbon reduction projects. Thus, in theory, the amount of carbon dioxide *reduced* by purchase of the allowance corresponds to carbon *produced* elsewhere. There are many examples. One of the simplest is in the airline industry, where major airlines are now allowing ticket buyers to offset the carbon emission of their travel by paying an extra fee for carbon offsetting. Those extra fees are used to fund carbon reduction projects, such as purchasing and planting trees. Overall, these transactions make a market that directly and indirectly

transforms carbon emissions into marketable securities.

The emergence of carbon offsets has spawned a new and growing industry of “carbon offset providers.” These entrepreneurial ventures facilitate the trading of carbon credits between private entities and publicly traded organizations around the world by promoting and financing specific emission-reducing projects. These projects are financed via the buying and selling of offsets by individuals, groups, and firms interested in sustainability.

Since “carbon neutral” was named the *New Oxford American Dictionary*’s word of the year (Main, 2007) five years ago, an industry for carbon trading has emerged. Though more active in Europe, this movement to trade carbon also exists in the United States and Asia in varying regulatory and market settings. Whereas carbon offset providers qualify as firms, they are a force for environmental action in the business world and have peculiar organizational aspects.

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Unfortunately, we understand very little about the operations and strategic actions of carbon offset providers. Indeed, the entrepreneurial firms that undertake carbon offsetting and facilitate sustainability projects compete in markets as unregulated as America's old Wild West. What's more, it is not clear that the movement involving trading carbon emissions delivers what it promises (Ambec & Lanoie, 2009). Beyond the facile slogan that reducing carbon emissions is *the right thing to do*, researchers have yet to align the mechanism with positive environmental and business outcomes. Moreover, the idea generates social, natural, and economic perspectives that can be antagonistic to one another (Marcus & Fremeth, 2009; Murphy & Coombes, 2009; Siegel, 2009).

What is missing is a formal examination, based on evidence, of what is basic but also unique to the area. One such element is the carbon offset provider. Their relevance derives from major international policy initiatives encouraging implementation and the large number of firms populating this industry. Our evidence-based investigation contributes to filling this gap and establishing a foundation for research in this burgeoning social and environmental context within the domain of business studies. It is the first large-scale empirical examination of these firms.

We analyze quantitative and qualitative data from 117 cases from eight different countries. We use industry effectiveness criteria to identify the best carbon offset providers and delineate criteria that distinguish those firms. In so doing, we generate new insights into how these providers and markets can and do influence carbon emissions through the transaction of carbon credits. We also shed light on how this market promotes the generation of social and natural denominations of value.

Our paper is divided into four major sections. The first section provides a background and history of carbon neutrality and offsetting. The second introduces and discusses the performance of carbon offset providers as firms. The third section describes our two-phase empirical study. Finally, based on the evidence, we offer an agenda for future research in this area.

Carbon Neutrality and Offsetting

The concept of carbon neutrality has been in popular usage for over a decade, although it originally emerged from modeling research on pollution reduction in the late 1960s (Burton & Sanjour, 1967). This early work explained the measurement and reduction of pollution in geographic locales to control forms of environmental degradation such as acid rain. This work led many companies to take identifiable steps to reduce their carbon emissions, and that trend evolved into the concept of carbon neutrality and environmental commodities markets for reducing emissions of greenhouse gases.

Carbon neutrality is the baseline criterion for the movement. It can be achieved in five general steps (Clean Air Cool Planet, 2006). The first step is to assess a carbon footprint—that is, the amount and breakdown of different greenhouse gases an individual or organization produces. Tools for estimating footprints, such as Web-based calculators, are widely available for use by individuals and corporations. Once a person or company determines its approximate amount of carbon emissions, the next step is to formulate a strategy to reduce emissions through changes in energy conservation and efficiency activities. The third step is to estimate remaining carbon emissions—those that are not eradicated in the previous step. The fourth step is to purchase carbon offsets for that remainder. The fifth step is to communicate carbon neutrality status. This final step is more applicable to larger organizations than it is to individuals or smaller firms.

The concept of carbon neutrality and this approach offer a market-based form of accountability for business processes and individual and organizational activities. Rather than merely talking about climate change and what is hypothetical, it offers a more constructive setting for action. Carbon offsetting thus offers a solution based on markets rather than a traditional regulatory approach. As a market, however, it is underdeveloped. For instance, there is no standard of what qualifies as a carbon offset. It is an intangible commodity, to be sure, but it is virtually impossible for consumers to make distinctions between high- and low-qual-

ity offsets or evaluate the carbon offset providers dealing in them.

The biggest inefficiency in this market comes from the accounting and verification associated with reductions. There is concern regarding our ability to accurately measure and report carbon emissions. As such, independent bodies have emerged to serve as sources of verification. For example, until November 2010, firms could join the Chicago Climate Exchange (CCX), in which members committed to reducing emissions by a minimum of 1% per year, for a total reduction of 4% and a future reduction schedule (2010) requiring 6% emission reductions.¹ The CCX also offered the measurement and verification associated with offsets. Its 210 member companies (including Motorola, DuPont, and Ford) in 2006 were on track to reduce 6% of carbon emissions by 2010.

Carbon Offset Types and Projects

Offset providers usually offer three types of projects: carbon dioxide offsets, renewable energy credits (RECs), and cap and trade. Carbon offsets are sponsored projects usually sold by the ton and are designed to reduce or eliminate greenhouse gases in the atmosphere. Common examples of these projects are reforestation projects, carbon sequestration (wherein carbon dioxide is captured from the atmosphere), methane abatement or reduction, and the development of energy-efficient technologies. Here, the greatest issue is verification of ownership since offsets are salable numerous times to different parties. Another challenge is one of permanence—whether the change created by the offset will stay intact—especially in the case of carbon sequestration. Even in nature, the carbon absorbed by a tree in its lifetime is released back into the atmosphere once the tree dies (Main, 2007).

The second type of carbon offsets is renewable energy credits. These credits are also referred to as “green tags.” They are measured in megawatt hours of renewable energy production. Examples

of this type of offset include wind and solar farms and bio-gas generators. The most relevant inefficiencies in this market are verifiable ownership and whether the project would have taken place without the required investment (Main, 2007).

The third type of carbon offsetting is cap and trade. Cap and trade offsets are known as “emission trading schemes” and sometimes as “pooled carbon commodities.” The participants in these offsets commit to reducing greenhouse gas emissions to a certain level. Upon reaching that level, further reductions can be sold or traded in the form of certificates. Active entities in this area include the CCX, the Clean Development Mechanism (CDM) under Kyoto, and the European Trading Scheme (ETS). The certificates for these cap and trade offsets are traded like stocks.

The markets for each of these types of carbon offsets are discontinuous and imperfect. Buyers can include individuals, nonprofit groups, and corporate entities. There are also many different kinds of sellers, including companies, charities, community groups, and international agencies. Examples of projects include planting trees, preventing deforestation, and replacing carbon-producing equipment and technologies such as coal-fired boilers. Pricing varies widely, as a ton of carbon can range from just a few cents to more than \$35 (Business for Social Responsibility, 2006).

Accredited carbon offset projects are linked with emission trading schemes as credits. For example, the ETS is the world’s largest cap and trade system (Convery & Redmond, 2007). Though the concept of emissions trading was proposed by the United States at the Kyoto negotiations in 1997, the EU ETS is implemented independently of Kyoto (Ellerman & Buchner, 2007). In Europe, emission allowances for the 2008–2012 second phase were selling for between €21 and €24 per metric ton of carbon dioxide as of July 2007 (Point Carbon, 2011). The voluntary CCX also included a carbon offset scheme that allowed offset project developers to sell emissions reductions to members who voluntarily agreed to meet emissions reduction targets.

Some industries are more active than others in carbon offsetting. For example, many firms in the

¹ The IntercontinentalExchange acquired the CCX on July 8, 2010, for approximately \$622 million. Though carbon exchanges still take place, the trading of carbon credits ceased in November 2010 due to inactivity in U.S. carbon markets.

travel sector are active in the practice. Some travel companies calculate a carbon footprint for flights and road trips and sell offsets to fund projects that produce energy without burning fossil fuels. As explained earlier, the reduction associated with the project equals (and thus offsets) the amount of carbon the travel activity produces. Travelocity.com offers this service by supporting projects that plant native trees. Another travel services company, REI Adventures, offsets 100% of carbon emissions with renewable energy credits. External providers have reported sales of 500,000 credits per year (Conlin, 2007).

It is unclear how much these programs actually influence climate change, but many customers apparently enjoy minimizing the impact of their travel (Higgins, 2006). Another example is luxury airline Silverjet, which claims to be the first carbon-neutral airline. They offset 1.2 tons of carbon per passenger by contributing \$28 per passenger to a fund for green projects. Offsetting travel expenses is also an option for pursuing carbon neutrality. Companies such as HSBC, which spends millions of dollars on carbon offsets for business travel, make carbon neutrality part of their brand identity (Braden, 2006).

Carbon Offset Markets

Despite the social purpose of carbon offsetting, markets created by the practice maintain a sort of “cowboy” atmosphere in which guile is common. The regulated portions of these markets were worth \$70 billion globally in 2010. The thriving unregulated components of these markets, however, are worth \$4 billion and consist of worthless credits that yield no reduction in emissions (Harvey & Fidler, 2007). The regulated component has the benefit of oversight from state or institutional agencies. Moreover, the former component entails policies mandated by state or other agencies via taxes, subsidies, caps, and targets. Emissions are taxed or a subsidy is provided to encourage clean technology adoption. This strategy is popular in European countries. Incentive-based systems within the regulatory component enrich offsetting, but also admit some ethical challenges based on accounting and verification.

The unregulated component of the carbon off-

set industry is far more entrepreneurial. Its Wild West atmosphere offers great opportunity and considerable risk for firms and customers. Under a pure market-based strategy, the solutions are driven by the industry or consumers and tend to include freely traded emission permits and voluntary carbon offsets. Emission permits are essentially a “pay to pollute” model. That market is made by “clean” companies selling excess permits to polluting companies to cover excess emissions. Voluntary carbon offsets are also referred to as gourmet offsets. These offsets are not required by the Kyoto Protocol² or any other governing regulatory agency. The credo of voluntary offsetting is “reduce what you can, offset the rest.” These offsets focus on that part of the entire carbon footprint that may not be fully addressed via more direct emissions reductions strategies.

The compliance market for carbon offsets is a unique setting in which companies and governments buy carbon offsets to comply with caps on what they are allowed to emit. This market exists to comply with the obligations of Annex 1 Parties under the Kyoto Protocol and liable entities under the ETS. In this market, certified emission reductions (CERs) can be traded by entire countries. The compliance markets have not received the same level of scrutiny that pure market and non-compliance solutions have received for allowing companies to pay for emissions instead of making cuts (*Economist*, 2006; Friedman, 2007). That practice is known as “paying to pollute.” However, if not for larger firms, these markets do allow individuals, households, and small companies to participate. As of late 2009, more than 100 firms around the world serve these constituents. As we show below, finding carbon offsets to purchase is just one piece of the puzzle. The real challenge is to effectively engage the huge range of opportunities with the right offset provider to make an actual impact (Hamilton, Bayon, Turner, & Higgins, 2007).

² The Kyoto Protocol was inaugurated in 1997 and ratified in 2005 for countries to reduce emissions through market-based solutions: the CDM trading CERs. Transactions are board-certified via assessment and approval processes. Credibility and validation are high, but the bureaucratic nature of these trades increases transaction costs.

Carbon Offset Providers and Market Performance

From a purely economic perspective, carbon offsetting works like any other market based on market signals and purposeful actor behaviors in a social setting. Yet the logic of the context recognizes that firms cannot merely buy themselves out of environmental responsibility (DePalma, 2006; Revkin, 2007; Russell, 2007). Therefore, carbon offset provider performance is somewhat difficult to assess because it is not always clear how to measure true performance. Some aspects of performance can add a measure of clarity: project quality, additionality, certification and standardization, single ownership, and price and transparency. We now examine each of these five performance aspects in turn.

Project Quality

The quality of a carbon offset project refers to its effectiveness in reducing carbon emissions. Although project quality is important to carbon offset market transactions, achieving it is not straightforward. For instance, projects that limit deforestation can inadvertently influence the hydrologic cycle as forested trees use water that naturally goes to other plants and grasslands. If those areas lose water, the plants and grasses inhabiting them die and release carbon. Thus, carbon offset provider performance entails approaching projects with care based on relevant science and an understanding of the ecosystem (Copping, 2007; Russell, 2007).

Definitions of quality can vary based on the industry or technology relevant to a project. The many different ways to measure and report are therefore all important to market performance. Formal comparisons of offset providers and project quality now exist for this purpose (e.g., Environment Data Services, 2008). Such comparisons illustrate, for example, that planting trees is of questionable quality based on how results are measured and likelihood of future carbon release. By contrast, renewable power projects are considered high quality, but the criteria are unclear.

Additionality

A unique aspect of carbon trading performance is whether the project would happen without the investment. Such evidence establishes a performance measure called additionality, or establishing that an action is not part of normal operations. If additionality is not clear, then the project is not properly qualified for carbon offsetting. The Clean Development Mechanism of the Kyoto Protocol uses three criteria to establish additionality: (1) not required by current regulation, (2) not based on common technologies, and (3) not facing economic, technological, or investment barriers. These criteria help demonstrate a bona fide need for offset resources.

However, as with the other criteria, measuring additionality is not straightforward. For instance, the CDM market alone includes approximately 60 different measurement methodologies. The lack of standardization in these methodologies calls for providers to measure their own projects on a case-by-case basis (Russell, 2007). Offset providers failing to qualify their projects have expressed exasperation, and the lack of standardization has led to action by the United Nations regarding CDM project approval. Indeed, the United Nations itself grapples with the issue of how to appropriately measure additionality (Ball, 2008).

Certification and Standardization

Carbon offsets are intangible goods, so their value and integrity depend on definitions and guarantees. There is a lack of standards for representing these elements (Broekhoff, 2007). Certification and standardization are seen as strong when they earn verification from third parties or external auditing entities. Thus, consumers in the carbon offset markets may choose from among dozens of standards and combinations of metrics to verify legitimacy (Hamilton et al., 2007). Such wild variation needs an independent standard, as it works against consumer confidence. The most effective standards are clear and rigorous and supported by carbon offset project developers and offset traders as well as buyers.

Currently there are three types of standards and certifications in the carbon offset market. The first

type certifies the quality of an offset and its projects. Examples of this type of standard include the Voluntary Carbon Standard; the Gold Standard; Plan Vivo; and the Climate, Community and Biodiversity Standard. The second type focuses on certification of sellers, products, and services and their claims. Standards that include this certification include Defra's Guidelines and the Climate Neutral Network. The third type comes from offset providers themselves as a means to ensure the quality of their portfolios. Examples include Carbon Neutral Company and MyClimate (Hamilton et al., 2007). According to Kollmuss, Zink, and Polycarp (2008), three components establish a carbon offset standard: (1) accounting for actuality and permanence, (2) verification and certification, and (3) registration and enforcement of transactions. These components make a registry of information available to the public with a system to track the ownership of offsets.

Single Ownership

Another distinct performance measure in the carbon offset industry is whether single ownership is achieved. This criterion refers to an offset that is sold to only one buyer, not multiple times to different parties. Carbon offset prices vary a lot, and this volatility in pricing strains perceptions of valid emissions reductions in projects, especially when one offset can technically be sold numerous times. As in any market, buyers seek assurance of sole ownership of what they purchase. Of course, one source of assurance comes from the offset providers directly. However, evidence of single ownership provided by an external body is a more powerful market performance indicator. Because of the lack of clarity around this particular issue, one certifier infamously referred to a voluntary carbon offset market as a "no-man's-land" (Russell, 2007).

Price and Transparency

When consumers have enough information to verify how an offset is to be made and how its price has been reasonably determined, prices and transparency are regarded as positive. As in any market, pricing and transparency are important. However, carbon offsetting generates peculiar

problems. Most offsets are CERs, and the estimated value of the market is \$2.7 billion (Point Carbon, 2009). Although the CDM market subsidizes these transactions, that is a highly bureaucratic and fragmented space with exorbitant transaction costs. Prices can range from \$1 to \$20 per ton of carbon dioxide, and projects range from planting trees in Tanzania to building hydroelectric plants in Bulgaria. The price differentials are based on project quality. However, as noted above, project quality variation is discontinuous and scores vary wildly. A somewhat curious aspect of carbon offsetting is that, compared to markets, transparency in transactions is greater for state regulators meeting Kyoto Protocol targets, which enforce the criteria that address transparency.

The set of performance measures discussed above has been used in trade publications and theoretical papers to examine carbon offset providers. However, they have not been brought together in a large-scale empirical study of evidence from provider performance data. To make such a contribution and partition the variance associated with true scores (in contrast to error), we collected data from a large sample, examined the five performance dimensions noted above, and used multiple raters to capture quantitative scores and qualitative data from the providers themselves.

Methods and Results

To examine these issues in the voluntary carbon offset markets and examine provider effectiveness criteria, we conducted a two-phase empirical study of carbon-offset providers. In Phase 1 of our study, we compiled a large sample of carbon-offset providers and then evaluated them using the performance criteria above. In Phase 2, we added qualitative data to the research. These data were collected via telephone calls and e-mail interviews with the same sample of providers studied in Phase 1. Our two-phase approach had two key advantages. First, capturing qualitative data in the second phase enabled us to interpret significant findings in context due to the modest theory development in this area. Second, finding the significant performance dimensions in the first stage gave a framework to collect and interpret the qualitative data and results. In the next section, we summarize

our main findings. We provide specific details of our statistical analyses in the appendix.

Phase 1: Quantitative Examination

Sample and Procedure. To identify carbon offset providers and construct a dataset, our seven-member research team identified as many firms as we could that sell carbon offsets around the world. All seven researchers have interest in sustainability and some familiarity with carbon offset projects. Five of the members were graduate students; two were tenured faculty members (the study authors) who teach and undertake research in the area of sustainable management and social entrepreneurship. We searched the Internet and various online databases for a period of approximately two weeks to create an initial sample of detailed information on 117 distinct providers.³

We examined each case to determine whether there was available data to make an appraisal on the effectiveness dimensions above (project quality, additionality, certification and standardization, ownership, and prices and transparency). To control for impression management and promote objectivity, we used third-party, external project protocols and provider certifications as a direct proxy for prices and transparency. As the team examined firms in detail, we removed three firms based on a lack of information necessary for straightforward scoring of the effectiveness dimensions. This process yielded a final sample of 114 firms with evidence sufficient for determining the five effectiveness criteria and executing our first analysis phase.

Quantitative Results Summary. In the quantitative part of the study, we found that additionality, certification and standardization, and transparency are the critical differentiators of the top carbon offset providers (specifics on methods and analysis are detailed in the appendix). These dimensions are a performance baseline that almost all carbon offset ventures reflect. Indeed, there was a ceiling effect for these dimensions, making them highly important across the board for all carbon offset provid-

ers. As might be expected, Table 2 (in the appendix) shows that the ratings were skewed for these dimensions, which follows from the fact that they are also less objective and can be examined with many different kinds of evidence. As such, richer insight comes from the complement of a qualitative examination.

Phase 2: Qualitative Examination

Sample and Procedure. In the qualitative investigation we sought a kind of datum that is not available via traditional surveys and ratings. It is one thing for observers to rate these firms on standard dimensions (as we did in Phase 1), but it is another thing to receive information directly from firms in the sample and use those reports to extend quantitative findings. Phase 2 adds this perspective. As noted above, there are no prior large-scale studies of carbon offset providers, and theories of firm performance fail to describe carbon offsetting adequately. Therefore, we examined the qualitative data with respect to explaining the significant dimensions and gleaned insights that help explain the Phase 1 findings. The appendix details the methods and analysis of this phase.

Qualitative Findings. We organized the verbatim survey responses into two categories: top providers and other providers. This organization reflects our research design in that the true differences between the leading providers and others in this industry are what this study intends to explain. Building on the performance criteria we reviewed, we developed five questions to ask the providers that reflect the performance dimensions used to analyze the data in Phase 1.

The qualitative results from Phase 2 were very informative. First, responses from non-top-rated providers averaged 34.34 words, whereas those of the top-rated ones averaged 25.5 words. Firms that were not leading providers followed through much more readily and provided more information in response to the survey items. That is, they answered the questions thoughtfully and more fully. In what follows, we present some key insights and examples from these qualitative data.⁴

³ A list of the 117 firms in the sample is available from the authors by request.

⁴ The full verbatim open-ended responses, e-mail script, and open-ended questions are available from the authors by request.

We first asked how projects for carbon exchange are selected. Top providers described the process in terms of sustainable development. For example, one cited “development-centric projects; with a social purpose”; another one cited “sustainable development in rural areas.” There was a clear tendency toward social causes. As the responses in the appendix show, the non-top-rated carbon offset providers indicated similar goals but gave more concrete responses. Phase 1 did not show much difference between the two groups on this dimension. The responses reveal a strong international orientation reflecting the influence of the Kyoto Protocol. There is also a focus on projects in developing nations in sub-Saharan Africa and the Asia Pacific region, reflecting the linkage between social and environmental purposes.

The second survey question pertained to additionality. We asked the respondents to detail the process by which they demonstrate to buyers the need for their carbon offset project. Top providers cited external investments and the importance of outside funds. One detailed donations as a source of support but avoided any allusion to the additionality issue. The other providers saw the link with additionality and responded with passion (e.g., “very important!” appeared twice, and “very significant”) but without providing much detail. Phase 1 showed that additionality was a dimension that distinguished the top providers from competitors. Indeed, these categories of responses show careful handling of a vital aspect of carbon offsetting based on relative position in the market: Top providers shared brief but objective information, whereas non-top providers expressed impassioned responses that showed adherence to additionality requirements.

In our third open-ended question we asked carbon traders about third-party certification. For this item, only one top provider responded, citing “several agents” and referring us to its Web site. The other providers readily provided specific names of the third-party certifiers, which we omitted for confidentiality. The latter group went far beyond the top providers in engaging this question. One gave us the name of the public accounting firm that audits their books. Certification for

transactions was a differentiator between the two groups in Phase 1, and based on Phase 2 data we explain this difference in terms of the liability of newness and struggles for legitimacy faced by less established carbon offset providers.

The fourth question pertained to single ownership of offsets. Here, the top providers answered in terms of their reputation. One described itself as a “globally recognized icon that advocates for high ethical standards and transparency.” The other providers referenced the names of the actual public registries they used. One intimated that they “only deal in verified . . . reductions that are on a registry and have unique certificate numbers” while pointing out that “everything else is just too dodgy to touch.” Beyond our Phase 1 results, these responses illustrate the importance for all carbon offset ventures, regardless of performance, to provide evidence of single ownership of offsets.

The final question addressed transparency and prices and was the third dimension that marked a significant difference between the two groups. Here, top providers again referred us to Web sites and merely stated that their pricing information is transparent. However, we noted that the level of transparency varied. One simply responded, “Yes, all the info is provided as needed to clients.” The non-top-rated providers gave much more information about brokers and registries to provide fuller disclosure. They also cited the actual prices. For instance, one provider cited their flat rate of \$8.00 per metric ton. These data shed some light on the significant finding for this dimension. Top providers have already had to prove themselves as forthright to grow as a business. The other cases, by contrast, are ready to respond to questions about how they provide information to their customers.

If we were to summarize the largest insight based on these data, it appears that top providers reflect additionality with actions instead words. This finding is important not only because it is a unique aspect of carbon offsetting, but also because it is a performance dimension that distinguishes the best providers. Whereas additionality is a unique aspect of this industry, one of our other critical dimensions—certification and standardization—was not. Certification and standardization were clearly important to carbon offset pro-

vider performance, but these criteria are not so different in this industry than in other industries. Finally, prices and transparency may be the most important differentiator of all, for reasons that would be expected. After all, carbon offsetting is a market, and many of the simplest market mechanisms still apply. We now discuss our findings more generally in the context of an agenda for future research in the area of carbon offsetting.

Research Agenda

Our study offers several implications for future carbon offsetting research. The kinds of firms entering carbon offsetting markets are very entrepreneurial and adaptable because they must function in highly unregulated environments. They face acute needs for strategic information as they try to build legitimacy and achieve viability. Studies on the nature of legitimacy in this space will be especially useful because reputation is a vital asset due to the absence of objective rules for the market. The legitimacy question raises interesting issues. For example, when do carbon offset providers aim to create real social impact in contrast to generating financial gain? Do they use carbon offsetting as a strategic weapon simply because it is *the right thing to do*? Chiu and Sharfman (2009) showed that these firms engage in socially purposeful activities far more often when they are visible because of legitimacy pressures. Our findings show that variance in firm strategies and objectives for acting socially purposefully vary most when it comes to the performance dimensions of additionality, certifications and standards, and prices and transparency.

We found evidence that providers lose sight of their original objectives as they become more viable. For instance, the top offset providers were less inclined to explicitly demonstrate transparency and explain project purpose. Future studies can shed much needed light on the underpinnings of a shift away from original objectives or even the presence of a tipping point. The non-top providers face other kinds of challenges, such as certain liabilities of newness. As the carbon offsetting industry is an unregulated social setting, transparency tends to be exhibited in strategic ways. In-

deed, all three significant differentiators of carbon offset providers (i.e., additionality, certification and standards, and prices and transparency) have much to do with valid information in a market setting. As top providers settle into routine transactions with reliable consumers they develop a lower capacity to respond to unplanned inquiries. Of course, that posture hinders adaptive firm strategy, which is important in a turbulent environment like the carbon offset industry. Studies of the adaptability of firm strategy and operations in the volatile carbon offsetting environment are thus of high importance.

There is also a profound need for longitudinal research in this domain. Most of these providers are Web-based startups. Failure rates are high enough among that entrepreneurial population, but, given the volatility of the nascent carbon offsetting industry, performance has more to do with uncertainty than it does with risk. In other words, it is not even clear what the criteria for carbon offset provider performance mean. Thus, how providers can and should evolve over time could be best captured in a series of small-sample case studies that offer deep insights using case data. Such research would go a long way toward asking the right kinds of questions to guide future large-scale studies like this one.

Our study shows that non-top performers say they value additionality more often and with greater zeal than the top performers. We suggest that an element of performance in the carbon offsetting industry involves being less explicit with signals. Top providers demonstrated additionality in ways that were tacitly clear instead of overt and direct. They reflected additionality in clear language on public materials and in communication without even using the term. By contrast, the more emphatic responses of the non-top providers seemed to use additionality as if it were a buzzword. As we noted, carbon offsetting is peculiar, and this is not a concept that means much to other industries. As such, carbon offset venture research must clarify the peculiar importance of additionality and clarify how firms perform in relation to it.

Future research on carbon offsetting must include direct contact with providers. Such contact

includes visits, interviews, and telephone calls. These methods are valuable in particular because there are almost no standards among cases. Along these lines, visits to project sites are the best way to collect data and validate findings. These methods will allow unparalleled detailing of the operations to support action research studies, which involve participation and collaboration. Such methods are particularly appropriate to the carbon offsetting industry. On a related note, research emphasizing international settings is directly applicable to the carbon offsetting industry. As we built up our own expansive list of carbon offset ventures, we had to leave out several cases due to language barriers. Although all members of our research team are multilingual and as a group can communicate using six different languages (Chinese, English, Korean, Hindi, Polish, and Russian), the international contexts populated by carbon offset ventures still presented communication challenges. Thus, action research involving partnerships with local cultural expertise is important to any research program in this area.

As such, the cross-cultural dynamics become important, too. For instance, some cultures embrace pure market mechanisms, whereas others are more accustomed to centralized state power. Given the peculiar nature of carbon offset transactions, the notion of a compliance market, and its intense international context that transcends developing socioeconomic systems, the right setting for a successful carbon offsetting industry is not clear. At this stage, what is clear is that carbon offsetting is a new type of business activity intended to target long-standing concerns about the natural environment.

Prior theory does not explain carbon offset firm action very well. Even the nature of the basic carbon offset transaction can be befuddling to many business academics and students. As we have professional interests in sustainability and social entrepreneurship, we know from experience that the proportion of MBA students and business school professors who can explain and discuss carbon offsetting is very small. Our explanation in the first section of this paper provides a starting point for such discussions. We expect education and awareness of carbon offsetting to increase in

the coming years through new business school curricula and new industry jobs that draw more deeply from the sciences and drive the entrepreneurial sector. These developments will ensure that research and pedagogical activity in this area is not only important, but interesting.

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Appendix

Phase 1

Data Analysis. The survey form we used to rate the sample cases included a definition for each effectiveness dimension, links to all relevant effectiveness criteria information for each provider, and any additional information about the provider. Each of the seven members on our research team used a five-point scale to score every provider within-raters in terms of how strongly the case reflected each of the five effectiveness criteria. Score anchors ranged from “an extremely high extent” to “an extremely low extent.” The middle point was neutral, and the scale included moderate positive and moderate negative responses. We derived dimension scores for each case based on average scores from all seven raters. During this procedure, we met biweekly to review progress. Near the end of the rating procedure, those discussions began to center on any cases of radical disagreement among raters. If such variance was due to rater misinformation, the cases were reevaluated. If such variance was due to valid differences in perspective, the case scores were retained. This process took approximately eight months. This data collection window included the removal of invalid cases from the sample, as two providers apparently ceased operations.

Statistical Results. Table 1 presents means and standard deviations for each of the five effectiveness dimensions and interrater reliabilities for all six raters based on intraclass correlation coefficients. The data did not appear to violate any general linear model analysis assumptions, and based on conventional procedures (Hays, 1994), these descriptive statistics show evidence that the score distributions and levels of rater agreement do not threaten the conclusion validity of the large-scale tests.

After we scored all the providers on the five dimensions, we identified the top 20 providers in our sample based on our rater scores. To examine the content validity of this categorization, we compared our categorization with *A Consumer's Guide to Retail Offset Providers* (Clean Air Cool Planet, 2006). This guide informs carbon offset consumers about the market and is widely used for evaluating offset providers in light of the unregulated carbon offset industry. The guide lists five top offset providers based on consumer reports and research. The list fully coincided with our 20 top providers in that each of the top providers was also included in our top-rated providers based on our ratings.

Table 1
Descriptive Statistics ($n = 114$) and Interrater Intraclass Correlation Reliability Estimates for Carbon Offset Provider Performance Criteria

	Means (best, other)	<i>s</i>	Intraclass Correlation (95% Confidence Interval) ^a	Skewness Statistic Divided by Standard Error ^b
Project quality	3.89, 3.66	.640	.67 (.49–.80)	1.97
Additionality	3.44, 3.02	.734	.64 (.44–.78)	.031
Certification and standardization	3.68, 3.24	.790	.73 (.58–.84)	.022
Single ownership	2.97, 2.79	.632	.45 (.15–.67)	2.00
Price and transparency	3.73, 3.34	.714	.56 (.32–.74)	1.64

(a) All intraclass correlations were significant ($p < .001$).

(b) Skewness statistics more than twice their standard errors indicate departure from normal distribution.

Table 2
Analysis of Variance in Effectiveness Criteria ($n = 114$): Best and Other Offset Providers

		Sum of Squares	df	Mean Square	F	Sig. ^a
Project quality	Between	.83	1	.83	2.03	.157
	Within	45.50	112	.41		
	Total	46.33	113			
Additionality	Between	2.79	1	2.79	5.37	.022
	Within	58.15	112	.52		
	Total	60.94	113			
Certification and standardization	Between	2.93	1	2.93	4.86	.030
	Within	67.68	112	.60		
	Total	70.62	113			
Single ownership	Between	.49	1	.49	1.21	.273
	Within	44.70	112	.40		
	Total	45.19	113			
Price and transparency	Between	2.29	1	2.29	4.62	.034
	Within	55.35	112	.49		
	Total	57.64	113			

(a) Bolded values indicate significant two-tailed tests ($p < .05$).

We used the scores from the rating procedure that identified the top providers and executed a one-way ANOVA to explain variance in effectiveness criteria scores. Table 2 presents the results, based on effectiveness dimensions for top and other providers in the sample. The mean scores in the descriptive results show prima facie evidence that the top providers are more effective in all five dimensions. Those differences were significant for three dimensions: additionality, certification and standardization, and prices and transparency.

Table 3 shows means, standard deviations, and Cohen's *d* (effect size) calculations for the five effectiveness criteria based on top and other provider scores. This analysis went beyond the reliability of the significant effects to assess their magnitudes. Following the standard method, we used pooled standard deviations to calculate these effect size estimates. The results show each significant reliable effect reported in Table 2 to derive from an effect size exceeding .50, which Cohen (1988) classifies as medium.

Table 3
Scores (Mean/Standard Deviation) and Effect Sizes: Best and Other Offset Provider Effectiveness Criteria

	Project Quality	Additionality	Certification and Standardization	Single Ownership	Prices and Transparency
Best Offset Providers	3.90/.501	3.44/.662	3.68/.754	2.97/.556	3.73/.676
Other Offset Providers	3.66/.659	3.02/.730	3.24/.781	2.79/.066	3.34/.708
Effect size (d)	.375	.579	.557	.285	.546

Phase 2

Sample and procedure. The qualitative sample began with the same 117 firms from the quantitative procedure. First, our research team (five assistants and two professors) attempted to contact each provider directly via telephone using a standard script.⁵ We divided the sample among the team based on geography. Two members contacted the U.S. providers; another pair contacted the U.K. ones. One team member contacted the European providers (representing France, Germany, Sweden, and the Netherlands); another pair contacted the Australian and New Zealand ones.

Five of the firms (4.2%) we called had contact numbers that were out of service, and 11 of the Web sites were nonoperational (9.4%). For 25 of the cases (21.4%), the telephone numbers led directly to voice-mail recordings. In those cases, the team members left recorded messages. None of those providers returned our calls. Of the providers reached directly by telephone, 12 (10.3%) declined participation. Twelve providers (10.3%) had a seemingly working number that was not answered when called. We discarded those cases. In 27 cases (23%), the recipient of our telephone call agreed to receive the survey via e-mail. Once

they opted in, we sent them an e-mail message with six open-ended questions. Fifteen of the cases (56% of those assenting; 13% of entire sample) returned completed surveys, proportionally representing the top and other categories in the larger sample. We used these data in the second phase of our study.

Collecting and analyzing the qualitative data were a far more challenging task than that of the quantitative method in Phase 1. For instance, this phase took almost 22 months to complete. Much of the sample of 117 providers was composed of international providers outside the U.S. This particular mix of cases required some teams to make telephone calls long after midnight U.S. Central time (e.g., for Australian providers); some made calls during predawn hours (e.g., for some European providers). The lag times between the many necessary callbacks, e-mailing scripts, follow-up e-mail reminders, and receipt of completed surveys were considerable in some cases. There were also some spoken language barriers.

The final response rates in Phase 2 were 20% for U.K. providers, 15% for Australian providers, and 14% for U.S. providers. Some of our research team noted that the international providers were more agreeable to our inquiries, likely due to different norms of environmental regulation and scrutiny in their national economic systems.

⁵ The telephone script is available from the authors by request.