PURDUE UNIVERSITY

Center for Food and Agricultural Business

CAB CS 10.3

Building and Implementing a Sustainability Strategy

Introduction to Sygenta

In November 2000, Novartis and AstraZeneca merged their agribusinesses to form Syngenta, the first global group focusing exclusively on agribusiness. Today, Syngenta is a leader in crop protection and ranks third in the high-value commercial seeds market. Sales in 2008 were approximately $11.6 billion. The company employs more than 24,000 people in approximately 90 countries or more. As a world-leading agribusiness, Syngenta is committed to sustainable agriculture—farming with future generations in mind.

Its employees are dedicated to the purpose of bringing plant potential to life—through larger U.S. corn harvests; more vigorous Brazilian soybeans; enabling smallholders in developing countries to grow an extra crop each year, thus improving nutrition and raising income; healthier vegetables at affordable prices; or more beautiful flowers for greater enjoyment. Through world-class science, global reach, and commitment to its customers, Syngenta strives to help increase crop productivity, protect the environment, and improve health and quality of life. Today, all around the world, company scientists work with a vast range of crops in local conditions and share their insights globally.

Syngenta offers a leading range of crop protection products that help growers control weeds, prevent disease, and protect their crops from insects. With growth across all regions, sales of crop protection products increased by 22 percent to $9.2 billion in 2008. In particular, sales of seed care products, which provide early protection from the moment of planting, increased by one third. Syngenta develops high-quality seeds that help growers boost yields and quality in a wide range of crops. Seeds sales increased by 16 percent to $2.4 billion, driven by excellent performances in corn and soybean, diverse field crops, and vegetables. Its new lawn and garden business offers a range of plant health solutions for consumers and professional growers. It comprises professional products and flower seeds, which are reported under crop protection and seeds respectively. In 2008, pro forma sales for the lawn and garden business were $864 million.

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Like all food and agribusiness companies, Syngenta is increasingly being challenged concerning its approach to sustainability. The Syngenta perspective and approach to sustainability is presented next. Purdue University has prepared supplemental readings to provide a broader context for the sustainability discussion and debate. The first supplemental reading summarizes the issues from both the corporate business world beyond the food and agribusiness sector, as well as the perspective of sustainability advocates. The second reading is from the Sloan Management Review and summarizes a recent survey of corporate leadership and decision makers concerning their responses to sustainability challenges and issues.

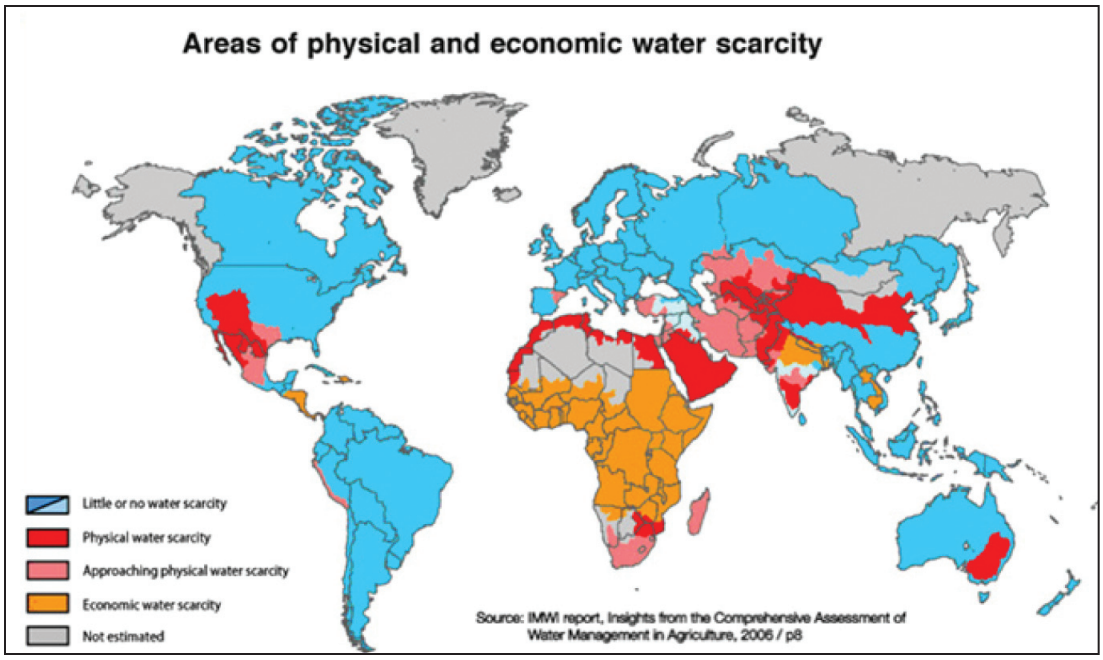
The Syngenta Perspective

Grow more from less. For Syngenta, these are more than mere words. For us, they capture both the challenge and constraints facing agriculture across the globe and set a course for the company as we move into the future.

The basic facts are well known, but are worth repeating:

- World population now stands at 6.81 billion and is increasing at a rate of more than 75 million per year (U.S. Census Bureau—International Program Center). Carried by past momentum, the population will grow to more than 9 billion before peaking sometime in the middle of this century and starting to fall. Falling fertility rates throughout this same period will also have demographic implications for labor markets and begin to disproportionally affect agriculture toward the end of the period (e.g., 41.5 percent of forecasted population growth to 2050 will be aged 65 and older, while only 3.6 percent will be age 14 and younger).
- Land resources are under pressure and in some cases degrading. While there are some opportunities to bring new lands into cultivation, the overall land base is essentially fixed. In other words, we are going to have to make it with the land that we have. One thought-provoking consequence of land scarcity is the recent action by several governments to purchase or lease farm land in other countries. Millions of hectares have been secured in Africa, Southeast Asia, and elsewhere by countries such as China, Japan, South Korea, Saudi Arabia, and the United Arab Emirates. A vigorous debate is ongoing concerning the pros and cons of this trend.
- The availability of fresh water is already a major constraint to agriculture (crop and animal) in many parts of the world, and many expect water scarcity to become the defining environmental issue of our day (Exhibit 1). This is a complex issue with physical, legal, economic, and political aspects adding to the challenge.
- Non-renewable plant nutrients (e.g., phosphorus) are expected to become increasingly limited and expensive due to the declining quantity and quality of available reserves. As competition for essential nutrients increases, supply and demand pressures for fertilizer could inject further strain onto the agricultural marketplace and limit our ability to provide food security to the planet.
- Climate instability is expected to increase, exacerbating periods of drought, flooding, temperature stress, and other fluctuations, collectively putting more strain on the environment and potentially influencing the range of various crop diseases, pests, and weeds.

Exhibit 1



- Forecasted economic growth will compound the influence of population growth, increasing the demand for a wide range of agricultural commodities. Most observers believe that total agricultural output will need to essentially double by the middle of the century.
- The most important trend, concerning malnourishment, is moving in the wrong direction. The Food and Agriculture Organization of the United Nations estimates that there are now 1.02 billion malnourished people in the world, with an increase of 105 million in 2009 alone.

Agricultural science has made great strides over the last 100 years. Crop yields, quality, safety, and efficiency have all improved dramatically. Challenges have been met that seemed almost impossible from the perspective of only a few decades ago. Despite this record of achievement, agriculture will have to do more. Even if the pace of gains of the last several decades is extrapolated into the future, a developing gap is expected because of the demand that most observers anticipate.

What does this mean? How will we meet this challenge and do it against the backdrop of an eroding resource base as outlined above? This question defines the great challenge faced by agriculture today. The status quo is not good enough. Thus, Syngenta has made the call to action: "grow more from less" (http://www.syngenta.com/en/grow-more-from-less/index.html).

Unfortunately, there is more to the story. We must not only meet this enormous technical and social challenge, but also, do it in the context of a trend toward increasing uncertainty with respect to market acceptance. In an era when proven, valuable, and safe technologies can be viewed with suspicion or even outright rejected, great care is needed in planning for the future. Development timelines and the overall cost and risk of R&D investments can be affected. When viewed through the lens of the food security challenges ahead, this trend is cause for concern.

Finding a way to reverse this unproductive trend is critical, so that all stakeholders can begin to collectively work together to address the enormous challenge of feeding the world's growing population. At Syngenta, we see this burgeoning global discussion about sustainability to be a very positive development in this respect. In the sustainability dialog, the right questions are being asked:

- How do we meet the needs of today without compromising the ability of future generations to meet their own needs? (from Brundtland Commission definition of sustainable development, 1987)
- How do we define the outcomes that allow us to accomplish sustainable development?
- What are the right metrics to measure our progress against these outcomes?
- How do we build all of the dimensions of sustainability (the environment, the social equity of our broader communities, and the economic viability of customers, ourselves, and our diversity of stakeholders) into plans and actions?
- Where are we today and how do we set a course to improve our performance as time progresses?
- How do we assure transparency and participate in a constructive process of learning, growing, and ultimately succeeding together?

Sustainability is clearly more of a journey than a destination. At Syngenta, we are engaged in this journey. Discussing aspirations and general principles is fairly easy. Translating these aspirations and principles into value propositions, business plans, and investments is much harder. The purpose of this case study is to discuss these more challenging elements and to do so within the context of our North American organization.

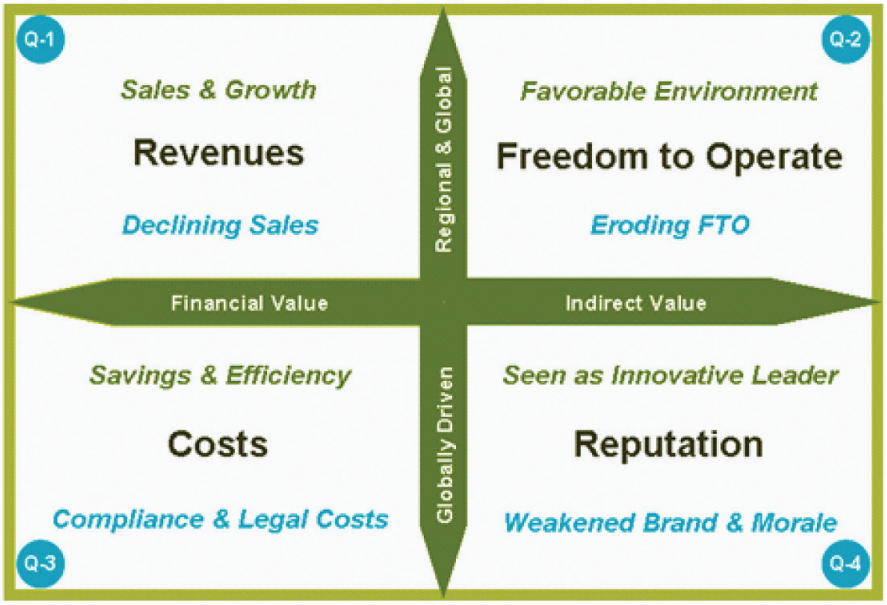
The North American Perspective—Sustainability Strategy

How do we approach the topic?

North America is our largest market, and the drivers connected to sustainability in this region are clear: cost savings and efficiency, downstream market demand and access, potential regulatory pressure, markets for carbon reduction/sequestration and other environmental services, brand equity, investor and stakeholder interest, etc. To organize our thoughts across this diverse landscape, we adopted a simple framework that recognizes value (both as opportunity and risk) in four basic quadrants created by two major axes (Exhibit 2). Sustainability has both tangible and intangible elements, and these apply to varying degrees both regionally and globally across the organization.

Within North America, our initial focus has been on the first two quadrants (Revenues and Freedom to Operate). Globally, quadrants three and four are also integrated. Depending on the choices and execution of Syngenta with respect to sustainability, there is the possibility of either loss or benefit in each of these quadrants.

Exhibit 2



What will change for our organization?

Syngenta has had a long-standing commitment to sustainable agriculture as demonstrated by exceptional stories worldwide that have a strong foundation of philanthropy, product stewardship, and environmental stewardship. These success stories have formed a solid record of corporate responsibility and have helped assure the company's freedom to operate. However, with a clear and urgent demand to provide solutions for global sustainability challenges combined with recognizing the need for science and technology as necessary parts of the solution, organizations like Syngenta must find new levels of engagement.

Syngenta is learning to connect its achievements in sustainable agriculture to its business imperative. This requires integrating sustainability into what we do as a business to deliver value and profitability to our customers, the food supply chain, and ourselves. The implication of this approach is that what Syngenta does as a business goes beyond increasing crop productivity and also addresses other environmental sustainability challenges of importance to society at large.

We believe that success will clearly require a strong science focus, R&D investments, and being "in it" for the long-haul. By asking the right questions to drive innovation, we can demonstrate how our products and services can be part of environmental solutions provided by modern and progressive agriculture.

What could be more inspiring for our 24,000 employees spread across the globe? The challenge is organizing ourselves to make this happen as we ask new questions, drive new innovation, and shift to new practices and business opportunity.

How do we define where the organization needs to go?

As we began our journey, we identified two main areas of questioning that would help to set the direction for the organization:

Landscape

- What are commonly held beliefs and perceptions on sustainability, and how should Syngenta address these?
- What are the major components of sustainability, and how are they likely to be measured in the marketplace? Who is driving this discussion?
- How will these measures affect what Syngenta provides to our customers and markets?
- What will be successful ways of engagement that lead us toward consensus and standardized methods and approaches?

Business Case

- How do Syngenta's products, services, and operations perform against emerging sustainability metrics?
- What opportunities are there to create value for our direct customers, their downstream value chains, and for Syngenta? What new market-based incentives are emerging for new ecosystem services (beyond productivity) provided by agriculture?
- What capabilities, alliances, and partnerships will be needed to be successful?
- What are the uncertainties around this value and what are the alternative business models that should be considered?

Landscape for Sustainability

For an organization to lead by example and provide science-based solutions that address global sustainability challenges, it must understand the realities of the current landscape and also develop a vision for transforming the future. Nothing less is acceptable for an organization that makes significant upfront investments in research and development. In other words, it is not a winning strategy for Syngenta to allow the perceptions prevalent in society (and often shaped by fear mongering, marketing, political pressure, and personal values) to steer its decisions. These beliefs and perceptions are indicators of current and past circumstances and, therefore, a lagging indicator that typically changes with the latest headlines. As a R&D organization, we must engage in the "next step" and what we believe is necessary to close the gap on sustainability. What consumers do need is a trusted food supply chain. This should be an integration of trust across the entire food supply chain. Therefore, simply providing the customer what is asked for is not going to accomplish desired sustainability outcomes.

Unfortunately, the current state in the food supply chain is a state of confusion. Today, there are reportedly more than 300 independent efforts within the North American food supply to define, standardize, audit, and/or certify elements of sustainability. Some are driven by science and attempt to be unbiased. Others are just the opposite. Many of these are overlapping or even contradictory.

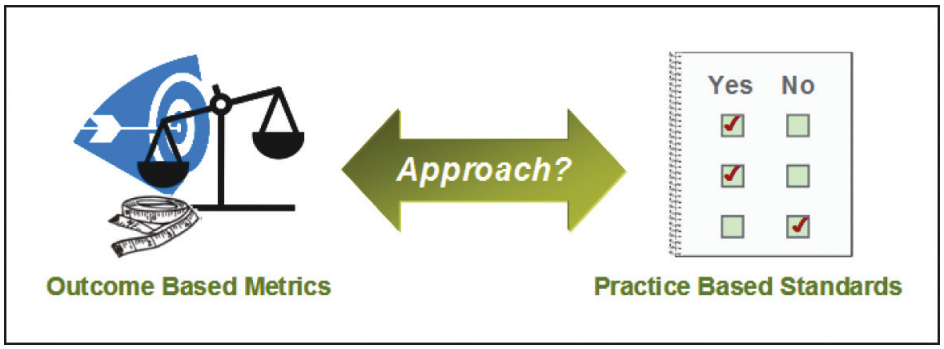
Clearly, all of them cannot succeed. The challenge is to map the landscape, understand the impact of the various schemes, support those that appear constructive, and prepare contingency plans for all of the likely outcomes.

Major questions exist in how sustainability is being defined and measured

There appear to be two major questions that largely define the emerging landscape: the overall approach and the view of technology (Exhibit 3).

Approach: The first question concerns the fundamental choice between outcome-based metrics and practice-based standards.

Exhibit 3



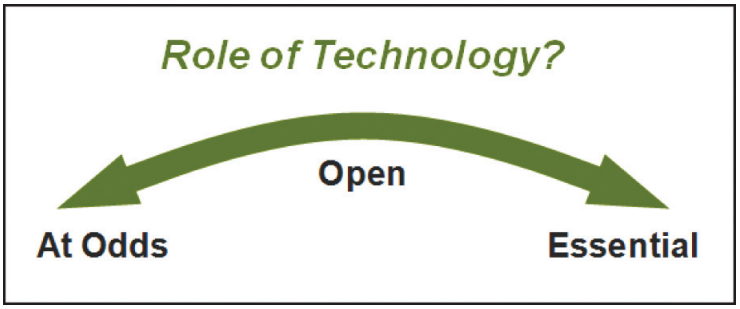
As the name implies, outcome-based metrics begin with a desired outcome. What is the target? (Examples from the sustainability field would include reduced greenhouse gas emissions or improved water use efficiency.) Once agreed upon, the challenge is to define metrics that will accurately measure progress toward achieving the desired outcome. This is easy to say, but often difficult to do. Healthy efforts to establish metrics are marked by transparent debate, independent validation, and ongoing review to incorporate improved understanding. Although outcome-based metrics are challenging to develop, they provide the local flexibility necessary for the majority of growers to participate and to embrace production methods that work best for a given circumstance (market, climate, environment, cropping system, etc).

In contrast, practice-based standards are offered as a prescription: "follow these practices and the problem will be solved." Typically (within the broader agricultural/food industries) these are based on "popular" understanding of cause and effect, but there are rarely metrics in place to measure progress toward outcomes. In many cases, these have been the focus of niche markets affecting only select types of growers and with an unknown impact on sustainability outcomes. The checklists can include hundreds of items. The burden on the farmer can be great. There is no incentive for innovation or ways to measure improvements from innovation, and the impact from a sustainability perspective is unknowable.

Syngenta is strongly on the side of outcome-based metrics and believes this approach has the best success of leading to meaningful progress.

Role of Technology: The second major question concerns the role of technology (Exhibit 4). Is technology fundamentally at odds with sustainability, or is it an essential element of any meaningful sustainability solution going forward?

Exhibit 4



This is an important question and one that illuminates presuppositions and basic principles on both sides of the discussion. Based on unintended negative consequences associated with some innovations in the past, should technology be viewed with suspicion? Out of precaution, should its role be minimized and, whenever possible, eliminated altogether? There are many that lean in this direction. At the other end of the spectrum, is technology always positive? Should the playing field be tipped in favor of what is new, and does the urgency of the moment justify a fast track to deploying the latest innovation? Balancing both of these views is an open stance toward technology. Technology is neither seen as at odds with nor necessarily essential to sustainability. All options are potential solutions, technological or otherwise, that are simply evaluated on the basis of the agreed upon measures of sustainability. Performance is the bottom line.

Syngenta supports this middle position. As a leading agricultural technology company investing more than $2.5 million per day in research and development, we are clearly strong believers in the value of technology. Despite this belief and commitment, an open position where technology is subject to evaluation ultimately provides the best chance for all participants to have trust in the system. Without shared trust, progress is likely to prove difficult.

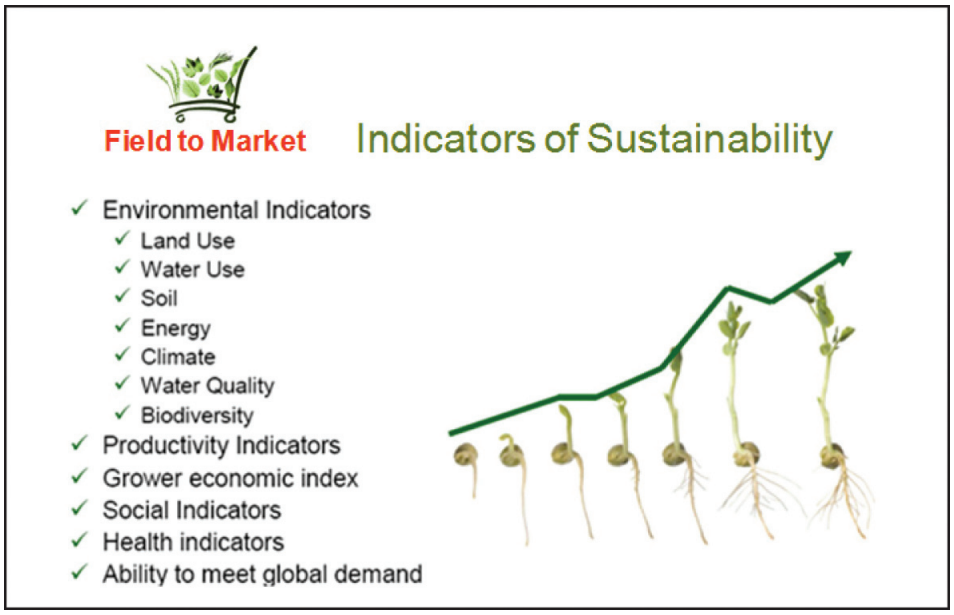
Discussion: During our landscaping exercise of the last few years, we have found very few initiatives that are both built upon outcome-based metrics and open toward technology. The vast majority fall under the heading of practice-based standards (with varying degrees of bias against technology—particularly crop protection products and biotechnology) or industry-driven initiatives that embrace technology but do little to build trust (and run the risk of appearing self-serving). We have also found that we are not alone in this assessment. Coalitions of stakeholders across all of agriculture have joined the discussion and are trying to establish workable solutions.

What emerging examples of collaborations exist?

Syngenta has engaged in the dialogue that is defining and determining how to measure sustainability. From a Syngenta perspective, one of the most important sustainability initiatives in North America is Field to Market (FtM), a diverse stakeholder group facilitated by the Keystone Center in

Keystone, Colorado. Field to Market represents organizations with a common interest in focusing on sustainable outcomes for production agriculture. The group is uniquely diverse, and its operating principles include transparency and inclusiveness. Using the format discussed above, FtM is clearly focused on the outcome-based metrics approach. With respect to technology, FtM takes a neutral position, neither promoting nor obstructing it. The philosophy behind FtM is to focus on the right outcomes, establish science-based metrics for measuring progress against those outcomes, and then "let the chips fall where they may." The presence or absence of a given technology is not the key. The important thing is the performance of the whole system: "How are we doing today, and are we heading in the right direction?"

Exhibit 5



Keystone FtM has developed metrics for five of the environmental efficiency indicators listed in Exhibit 5 (energy, water, climate change, soil, and productivity). A retrospective analysis of these metrics using national data revealed the benefits that U.S. growers, as stewards of the land, have provided over the past decade and offered insights as to what needs to be accomplished to reach sustainable outcomes going forward.

In general, Syngenta and other members of FtM recognize the importance of working with and through others in a non-competitive environment to begin to understand the sustainability landscape (what is known and what is currently unknowable). The FtM engagement has brought clarity to the need for improved trust in our food supply chains. Open collaboration with diverse perspectives and expertise from across the value chain is an essential first step in building that trust. Without this collaboration, the needs of one part of the chain could easily be met at the expense of another part (compliance driven and cost creating). Win-lose scenarios are rarely successful over the long term. FtM is trying to avoid this trap and lay the foundation for a win-win, value-adding future. If successful, it is hoped that FtM could ultimately provide a broad industry framework for sustainability.

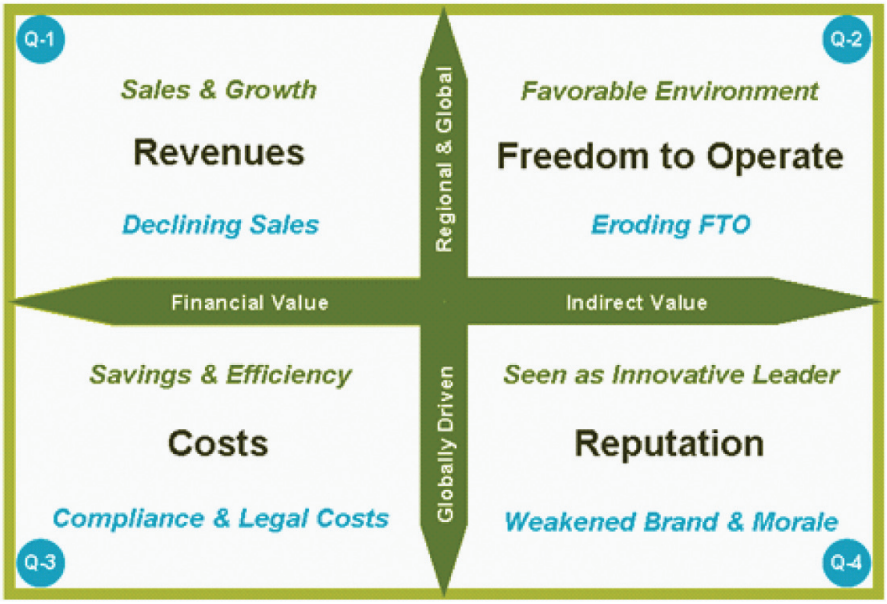
Various other initiatives are getting underway to develop Lifecycle Assessments (LCA) for consumer products such as the "Sustainability Consortium," a partnership of researchers, non-governmental organizations, government agencies, and business partners, jointly administered by the University of Arkansas and Arizona State University. Other completed LCA case studies for agricultural products have revealed the magnitude and importance of the agricultural production component of the footprint and challenges to be overcome (e.g., the UK Carbon Trust partnership with PepsiCo to generate carbon footprints). The systems approach inherent in LCA provides a means of moving from individual elements to net benefits in the broader context of the food supply chain.

In summary, metrics that measure progress toward sustainability outcomes provide Syngenta with new goals for the R&D innovation necessary to enable our customers to "grow more from less." Syngenta believes it is critical to promote transparency and standardization of these new methods for measuring sustainable outcomes and that they should be grounded in the best available science and subject to continual improvement. Success will require a different way of working, with increased collaborative capacity and transparency. Ultimately, sound metrics will direct innovation and encourage solutions that will benefit agriculture, the environment, and society as a whole.

Business Case for Sustainability

The business case for sustainability is multi-dimensional, with value coming from each of the four quadrants outlined earlier and repeated in Exhibit 6.

Exhibit 6

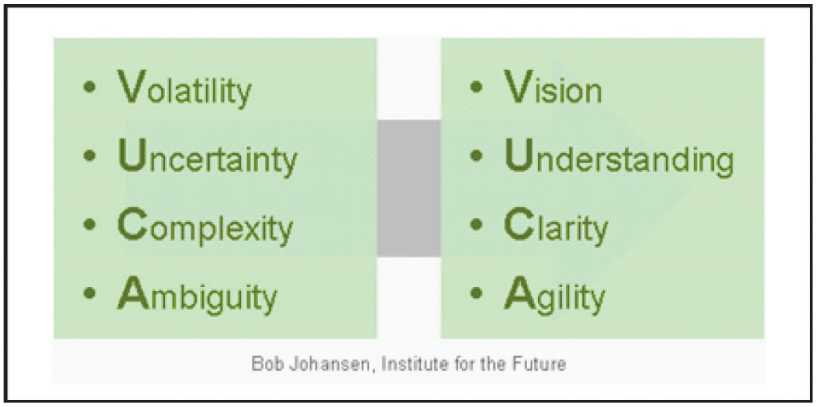


In each quadrant, total value is the sum of both opportunities realized (green) and risks avoided (blue). Syngenta is active in all of these quadrants, with sustainability providing a unifying theme for the overall effort. On a regional level (North America), the primary focus is on quadrants one and two.

As discussed in the landscape section earlier, great uncertainty remains around metrics and standards, regulation, environmental markets, and many of the other drivers of sustainability. This is the reality of the situation, and success requires recognition of that fact. Bob Johansen of the Institute for the Future builds on the military term VUCA (volatility, uncertainty, complexity, and ambiguity) to outline the processes and leadership skills needed to successfully navigate such an environment (Bob Johansen, Leaders Make the Future. Ten New Leadership Skills for an Uncertain World, 2009). The recommended approach includes:

- Flexible, decentralized, empowered networks within a structure of strategic intent
- Learning through immersive experiences, scenarios, and rapid prototyping
- Acceptance of uncertainty with intuition as a valid contributor to clarity
- Strategic sense-making beyond operational problem solving
- Uncoupling "winning" from the need for a solution
- Engagement with complexity

Exhibit 7



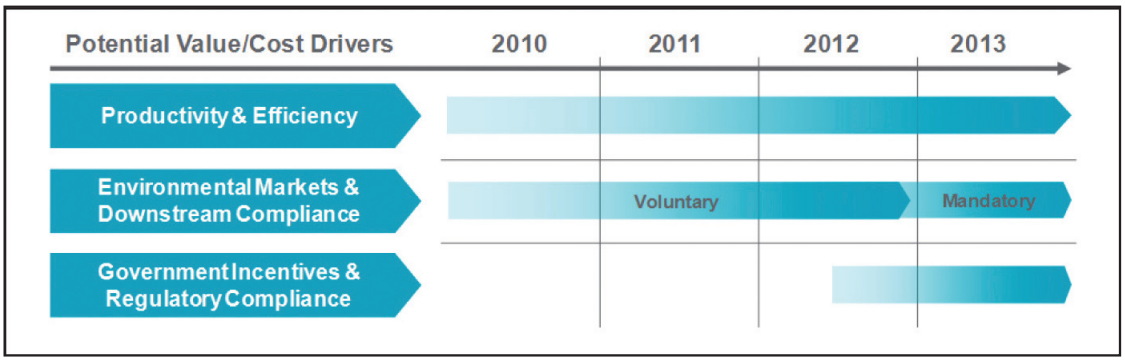
This is a process, a journey. Overtime, the shift in VUCA captured by Johansen in Exhibit 7 can take place. In North America, Syngenta is midway through this transformation on sustainability.

Essentially, our approach to sustainability is to engage in fast learning through small, focused pilots across our different North American business units. These allow Syngenta to develop considerable insight prior to making significant investments in sustainability. This is necessary, given the breadth of our portfolio, the diversity of our markets, and inherent uncertainty described above. By operating multiple pilots in parallel, we increase the likelihood that we will have the opportunity to work through the full range of complex issues that are driving sustainability. This approach also allows us to understand the major similarities and differences among the various market segments. We have developed insights into both the nature of value from sustainability, as well as the potential for integrated solutions of our products and services to positively impact the system.

Components of Value

One of the challenges in building a business case for sustainability is that the value driving the system is multi-faceted, complex, and emerges over a longer time period. Exhibit 8 illustrates three of the major categories of value creation.

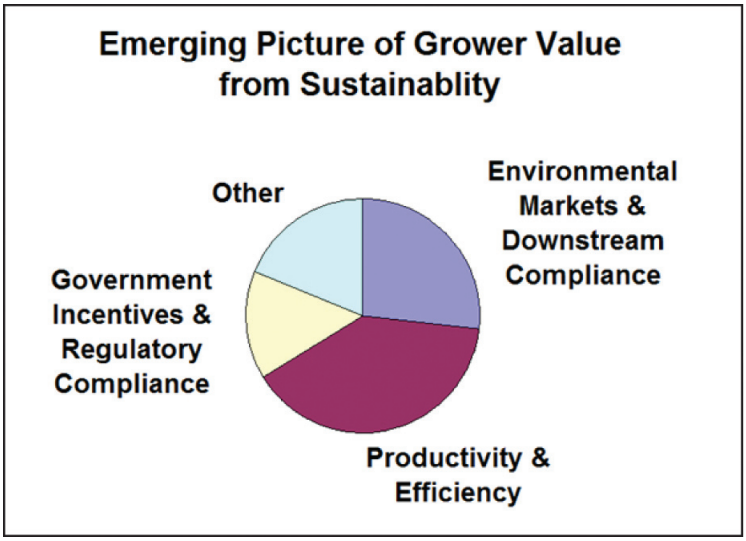
Exhibit 8



These range from the familiar (productivity and efficiency) to areas with tremendous uncertainty. In addition, the mix of value available (e.g., at a grower level) will vary by region, rotation, and the specifics of the operation. The challenge for Syngenta is to build flexible product and service solutions to empower customers to capture the value available given their circumstances.

The different categories of value are expected to phase in over the next four to five years. Precise estimates are not possible at this time, but one scenario for the production of U.S. Midwest corn suggests that value pie to be eventually distributed (5 to 10 years in the future) roughly as shown in the diagram below (Syngenta estimate):

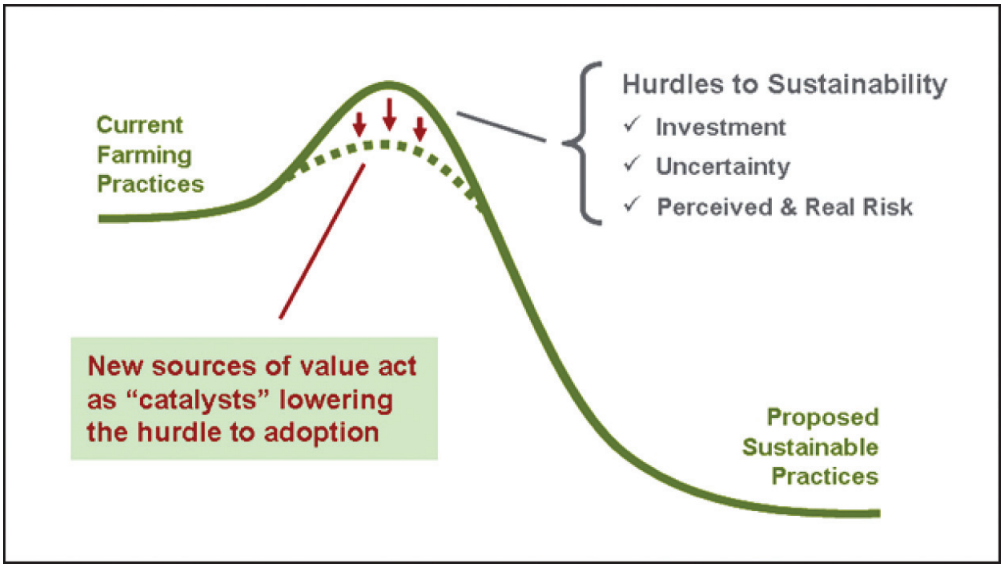
Exhibit 9



As can be seen in Exhibit 9, **Productivity and Efficiency** represent a major slice of the pie. This reflects the fundamental nature that productivity and efficiency have in the sustainability story as discussed earlier. Also important are the values tied to **Environmental Markets and Downstream Demand.** These are in their infancy today (e.g., voluntary, relatively low-value markets for carbon and water quality), and many are still in early draft form (e.g., the Wal-Mart sponsored Sustainability Index). Less certain, but anticipated by many observers, are **Government Incentives and Regulation** connected to sustainability.

These newer sources of value (beyond **Productivity and Efficiency**) are likely to be essential to drive adoption of improved sustainability practices. In many cases, improved sustainability will involve investment, uncertainty, and the risks associated with change. Without offsetting incentives (in the form of direct payments, market advantage, avoided costs, etc.), affecting change is likely to be difficult. The pilot studies to date have borne this out. Exhibit 10 illustrates the catalyzing role that new sources of sustainability value will play moving forward.

Exhibit 10

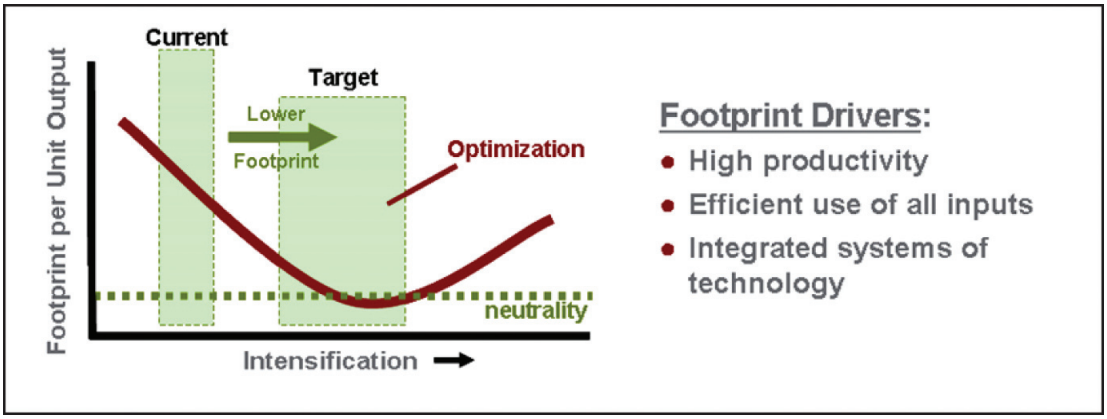


The mix and timing of the different value components appears to vary by market segment and geography, but the basic story remains the same. To be successful, Syngenta will need to leverage these new sources of value to help customers overcome both the perceived and real hurdles to drive adoption of new sustainable products and practices.

Technical Insights from the Pilots

In general, we have come to the somewhat paradoxical conclusion that increased intensification generally reduces the footprint of most agricultural systems, and thereby improves the performance against developing sustainability metrics (Exhibit 11).

Exhibit 11



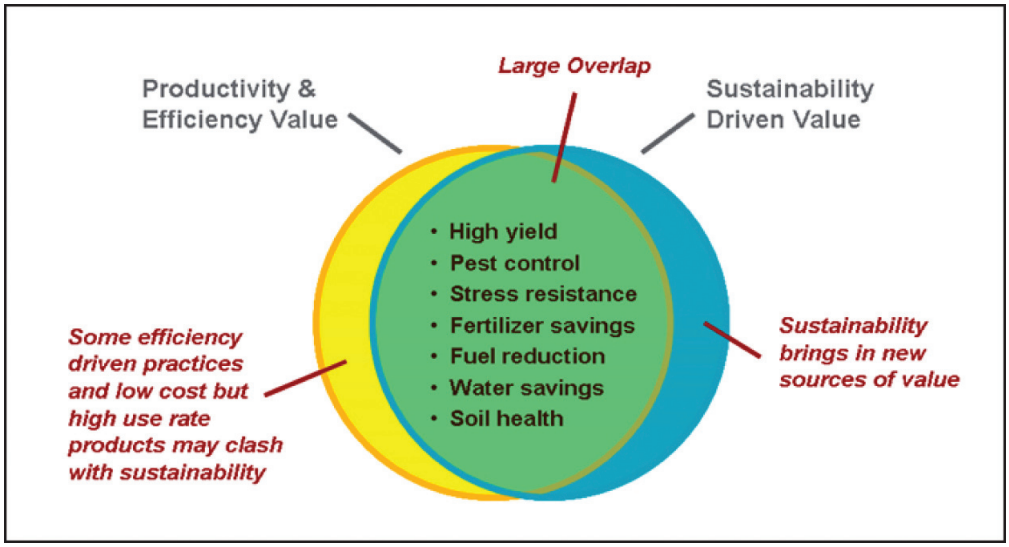
There is certainly a point of diminishing return in all systems, but the key for most crops is to get the most out of the precious inputs that have been invested on an acre of land. Optimizing and protecting yield is paramount.

We have also come to realize that our core business is already largely aligned with the emerging metrics of sustainability. Our longstanding business imperative (to deliver improvements in yield and productivity both cost effectively and efficiently to our customers through first-class research and development combined with sales and marketing excellence) has guided us in this direction. For Syngenta, this conclusion is not really new, nor is it that surprising. The broad conclusion across the food supply chain and in most industries is that practices that increase efficiency, reduce waste, and boost productivity also have the effect of improving performance against sustainability metrics. We have been supporting growers to farm sustainably for generations.

Exhibit 12 illustrates the considerable overlap between the traditional drive for agricultural productivity and efficiency and the emerging understanding of sustainability.

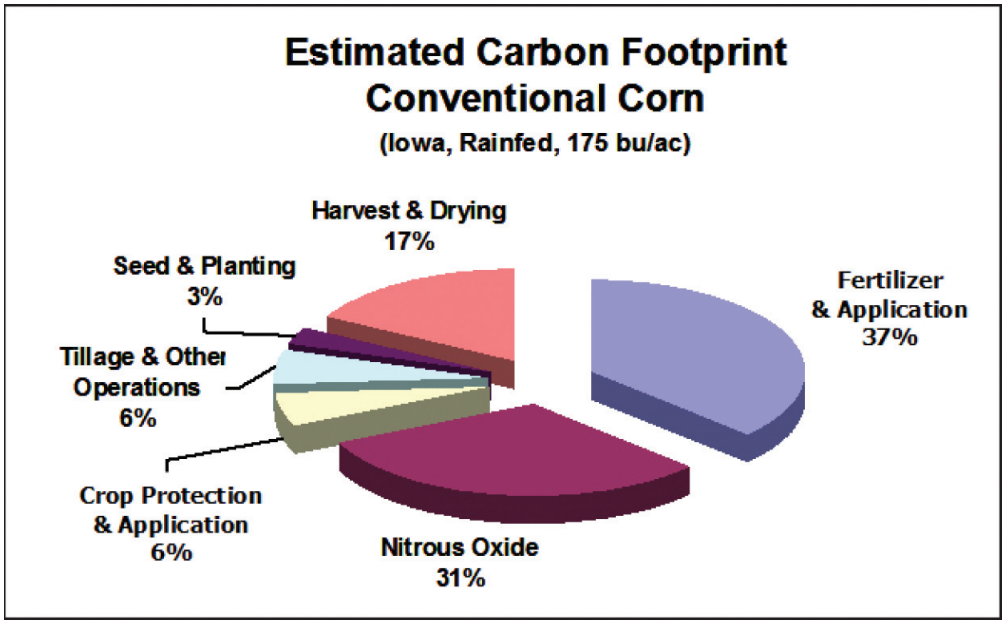
There is also insight to be gained from the areas that do not overlap.

Exhibit 12



On the positive side, there are new sources of value that previously would not have been significant. On the opposite side, there are some efficiency and productivity driven practices that are in tension with the drivers of sustainability. Examples of both can be seen in the average carbon footprint of a conventionally tilled corn scenario in the Midwest (Exhibit 13, Syngenta estimate).

Exhibit 13

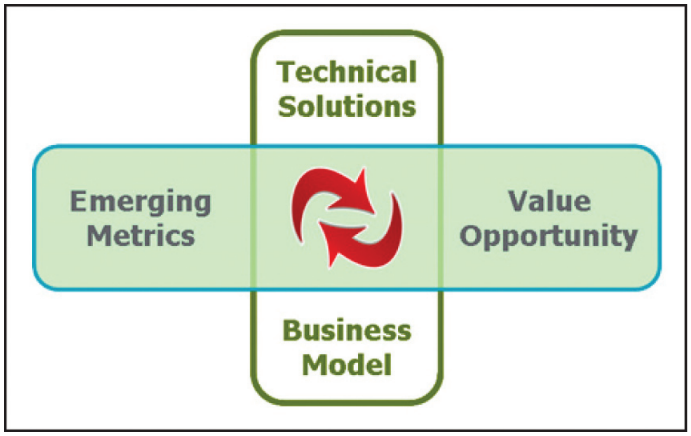


Nitrogen fertilizers (either in the emissions "embedded" in manufacturing, distribution, and application, or as nitrous oxide emissions) represent more than two thirds of the total carbon footprint of corn (37 percent + 31 percent = 68 percent). Historically, use rates have contained a 15 percent to 20 percent buffer due to operational practicalities, climate uncertainties, and yield loss concerns. Given historic nitrogen prices, this has been economically sensible in most years. Going forward, in a world increasingly accounting for carbon emissions (either as a "tax" or as an opportunity to earn credits through reductions), this approach will be more tightly scrutinized. Products and practices that reduce use rates and/or mitigate the risk of nitrous oxide (N2O) emissions will be increasingly factored into the economics of fertility management. Without the drivers of sustainability, this would not occur.

Continuing with the corn example, one of the major conclusions to date is that meaningful improvement against performance outcomes will nearly always involve a multi-faceted, systems approach. Single products will rarely be sufficient. The most likely scenarios involve changes in practices enabled by a suite of products, equipment, services, and information systems. Syngenta's greatest expertise is on the farm, but ultimately a full life-cycle perspective is needed. Changes at one level of the value chain can directly affect the efficiency and performance at other levels. For this reason, pilots are being done in cooperation with broader groups of stakeholders whenever possible.

In conclusion, it is too early to fully know the business value tied to sustainability. There are too many questions unresolved to allow accurate forecasting. Once the metrics and outcomes of sustainability are established, the potential value will come into focus. With a clear view of potential value and the metrics used to determine impact, it will be possible to propose technical solutions and design business models to share value among the participants.

Exhibit 14



As Exhibit 14 suggests, the process of working through metrics, values, solutions, and models will likely take several iterations before it takes final shape. The challenge today is to move forward without this clarity. Waiting until all of the questions are answered is not a solution and would only serve to increase the overall risks to the organization.

Concluding Remarks

A sustainability strategy allows Syngenta to have more control over its own destiny by characterizing future scenarios shaped by externalities and their potential impact. Success depends on outlining a business case that is about profitability and ensuring that Syngenta and our customers can compete on sustainability terms. However, it's more than just the components easily characterized by financials—it's also about our corporate culture and values, managing environmental risk, maximizing our freedom-to-operate, and ultimately, delivering on our brand promise. It's a long-term value proposition that requires making assumptions now, revisiting these assumptions later, and characterizing uncertainty. This will allow us to make better decisions now on how we can do it better, more efficiently, and in a way that is better for the environment and society in the long term. Essentially, profitability over time will take place within the larger context of sustainability where small incremental changes now could be significant in magnitude looking back from 2030.

Purdue University Discussion Questions

In your assigned teams, Purdue University Professor Mike Boehlje has asked that you address the following discussion questions.

1. What are your reactions to Syngenta's viewpoint and perspective concerning the sustainability issue? Have they captured the key concerns of shareholders and capital market participants? Of sustainability advocates? Of employees who are responsible to implement the strategy that is chosen? Of customers (farmers) who may or may not fully appreciate the issues?

2. What specific activities and actions might Syngenta consider to implement a strategy that is consistent with their perspective of sustainability?

3. Is the sustainability challenge different for companies in the food industry, such as Nestle, that sell products to consumers? Compared to Syngenta or similar companies that sell products to farmers or other businesses? How does this influence a company's strategy?

4. Should Syngenta reach out to engage the key influencers in the sustainability debate? Sustainability advocates? How might they engage other supply chain partners in this debate?

5. How should Syngenta consider sustainability issues as it makes R&D investments and other resource commitments?

6. Do you feel that Syngenta has accurately assessed the trade-offs between sustainability and productivity? How might they respond to those who have a different viewpoint, particularly those who might argue that technologies that increase productivity and intensive production agriculture in general are not consistent with sustainability goals and objectives?

7. What might Syngenta do to shape the metrics of success in achieving sustainability outcomes?

Supplemental Reading

The Sustainability Issue: A Purdue University Perspective

By Amber Rankin

Businesses, and specifically agribusinesses that rely heavily on natural resources, cannot ignore environmental and social issues and opportunities that have become prevalent in today's society. Faced with increasing government regulations and strengthening public opinions, businesses are urged to become more accountable for their impacts on society and more transparent in their activities as part of their dedication to sustainability.

Sustainability, as it was first defined by the Brundtland Commission in 1987, is the ability to meet the needs of the present without compromising the needs of the future. The vague nature of this definition has led many agribusinesses to formulate their own interpretations of sustainability. Companies have addressed sustainability in a number of ways, both narrowly and broadly, with some focusing exclusively on promoting eco-friendly or fair trade practices and others simultaneously incorporating environmental, social, and economic goals into a Triple Bottom Line philosophy (Carroll, 1991; Berns et al., 2009).

Environmental integrity goals involve protecting and restoring natural systems and resources. As natural resources become increasingly scarce, companies encounter limited access to and increased costs of inputs. In addition, as the population becomes more sensitive to environmental issues such as climate instability, water and energy availability, and declining biodiversity, companies must spend more energy focusing on the future and moving away from a business-as-usual approach (Ambec and Lanoie, 2008).

Social justice goals address business practices such as labor standards, poverty and hunger reduction, and the promotion of human welfare. In addition to adhering to regulations and protecting ethical and moral rights, social performance is tied to credibility and transparency. This often includes interactions, collaborations, and alliances with the supply chain, NGOs, and other environmental and social organizations (Perez-Aleman and Sandilands, 2008).

Economic prosperity goals include profitability, competitiveness, and efficiency with an emphasis on establishing a competitive advantage in the market. Companies are able to exhibit competency and capabilities by keeping close ties with suppliers and customers, maintaining awareness of what is working in the market, and keeping detailed information about customer behavior and market trends (Marcus and Fremeth, 2009).

A common sustainability debate among companies and their stakeholders is whether or not environmental, social, and economic goals are at odds with each other. It has been argued that environmental and social agendas divert efforts away from the company's other responsibilities, but it may also be the case that environmental and social performance can improve financial performance. Such thinking can lead to opportunities including better access to markets, introduction of

differentiated products, risk management, improved relations with stakeholders, and reduced cost of inputs (Ambec and Lanoie, 2008). The phrase "doing well by doing good" has become a mainstream business idea in that a company can no longer make a choice between doing good and being profitable. Instead, companies must be accountable in all realms in which they operate.

Sustainability Drivers and Challenges

Sustainability initiatives have become a global mega-trend, and society has increasingly turned to business, in addition to government, as a major source of sustainable solutions. Large agribusinesses have the potential to shape the future social, technological, and environmental landscapes in food and agriculture due to the fact that they have financial resources and technological knowledge to invest in sustainable innovations (Gunningham, Kagan, and Thornton, 2003; Jansen and Vellema, 2004). However, as the ideals of sustainability gain momentum, companies also become subject to increasing attention and scrutiny from society. Incentives, as well as pressures and challenges, for agribusiness companies pursuing sustainable practices come from a number of sources including stakeholders, markets, science and technology, policy, and the supply chain.

Stakeholders

Internal stakeholders, such as employees and shareholders, expect their companies to boost morale, improve brand image, and create value. Adopting sustainability initiatives aids in employee recruitment and retention when those employees share the same beliefs and values, and this can also lead to increased productivity (Markevich, 2009). However, such claims are often difficult to assess due to long planning horizons and lack of proper measurement tools for sustainability investments. The major challenge concerning internal stakeholders is proving that positioning the company to be sustainable creates brand equity and value for the customer and adds value in the capital market. Shareholders who want to see deliverables may view sustainable practices as nothing more than acts of philanthropy. Even if the company's strategies aim to create value over the long run, stakeholders often want to see payoffs in the short run (Esty and Winston, 2006).

External stakeholders, including consumers and society at large, influence the success of a company through market demand and license to operate (Porter and Kramer, 2006). There is a general trend of consumers and society becoming more critical of companies and more conscious of the impacts of their actions on their surroundings. This translates into an increased demand for transparency, accountability, and information from the companies that supply the market (Millenium Ecosystem Assessment, 2005).

One of the challenges associated with providing information to stakeholders is overcoming their limited understanding of sustainability. For example, a common perception is that sustainability is synonymous with organic production. While the two embody similar objectives, sustainable production encompasses a much broader scope. Beyond using a natural-systems approach to manage pests, soils, and biodiveristy, sustainable agriculture also includes issues such as carbon emissions reductions and landscape management and preservation. As a result of such confusion, there is a tendency for companies to develop sustainability definitions, standards, and metrics that are more

aligned with consumer perceptions rather than with science and sustainability outcomes. In order to inform stakeholders, a common response has been to develop practices such as issuing annual sustainability reports that showcase companies' social and environmental deeds. However, while these reports are easy for consumers to understand, they still often lack a framework or strategy for sustainability activities and leave out a considerable amount of detail (Porter and Kramer, 2006).

Markets

Marketplace success for food and agribusiness companies relies heavily on public perceptions of environmental quality and food safety. Sustainability opportunities include access to essential resources to promote human health, proper handling and storage during processing and retailing to prevent illnesses, and monitored food production to mitigate diseases (Kriflik and Yeatman, 2005). As a result, the need to ensure environmental and regulatory claims made by companies fosters new markets for credible reporting such as for loan requirements, sustainability indexes, and certification methods.

Some private sector banks have adopted the Equator Principles, a set of standards for approving loans that include the environmental and social risks and impacts of projects. Capital markets have launched indexes such as the Dow Jones Sustainability Index to recognize companies that are actively involved in sustainable practices. Eco-labeling and certification by third parties are becoming more important for providing information and transparency to customers. Environmental Management System (EMS) certification such as the ISO 14001 is intended to motivate companies to address environmental issues while creating a competitive advantage in the market through differentiation and increased resource productivity and efficiency (Orsato, 2006; Grolleau, Mzoughi, and Thomas, 2007).

The companies most affected by such perceptions and reporting requirements tend to be those that deal closely with end consumers and that have the most at stake to protect their overall image. Companies dealing primarily with business-to-business transactions face immediate demands that are generally less concerned about value added from sustainability and more concerned with efficiency and responsiveness (Grolleau, Mzoughi, and Thomas, 2007; Peterson, 2009). As a result, such companies often have less incentive to pursue sustainability opportunities and less ability to create value.

Science and Technology

Technology and innovation in production processes and product development are at the core of sustainability performance (Jansen and Vellema, 2004). Increased pressures on natural resources and the threat of serious potential environmental effects add to the vital role that science and technology can play. For agriculture, this includes innovations such as irrigation methods that reduce water use and waste, farming techniques that improve output while reducing resource use and soil depletion, and systems that use less energy and generate fewer emissions.

The importance of science and technology depends on the ability to measure their impacts on sustainability. A major challenge for companies is the anti-science, anti-technology attitude held by

a portion of society that leads to a lack of trust in large corporations and industries. As products and processes become increasingly complex and technologically advanced, consumers have increased difficulty comprehending how their food is produced. As a result, consumers faced with the prospect of too much danger and too little information may choose to turn away from what would otherwise be beneficial technologies (Jansen and Vellema, 2004; Vermeir and Verbeke, 2006).

Due to the fact that sustainability is an ill-defined term and that technological innovation is not always viewed as "neutral," sustainability impacts are generally subject to a number of different interpretations and metrics. One analytical method for developing sustainability indicators is lifecycle analysis (LCA). LCA evaluates the resource consumption and environmental impacts associated with a product, process, or activity at all stages of its life, including acquiring raw materials, producing, processing, and packaging, as well as using and disposing of the product. Lifecycle analysis re-establishes the connection between consumption behaviors and production practices while highlighting areas of possible risk and opportunities for improvement (Beamon, 1999; Heller and Keoleian, 2003).

Policy

Governments are addressing sustainability by raising environmental standards and regulatory pressures related to issues such as packaging, chemical exposure, food safety, water and energy use, and carbon emissions (Esty and Winston, 2006). The U.S. government has made attempts to place mandatory limits on greenhouse gas emissions through the use of carbon markets and cap-and-trade systems. Other forms of regulation and action include environmental education, political mobilization for higher pollution penalties, support for clean production, and charges for pollution or waste disposal (Jansen and Vellema, 2004).

Governments also influence sustainability through their expenditures. For example, a number of governments in Europe and the United States have adopted green public purchasing (GPP) policies that include sustainability criteria for choosing suppliers in order to encourage innovation (Ambec and Lanoie, 2008). However, despite such pressures, actual decisions that are made about technology use and methods of innovation remain largely under the control of the company (Jansen and Vellema, 2004).

Supply Chain

Modern agriculture in the United States is characterized by innovations, consolidations, and a tightly aligned supply chain. While economies of scale and efficiency gains in the supply chain are being realized, other challenges have emerged. Supply chains are being challenged by consumers, policy makers, and other stakeholders to deliver products with more attributes, including sustainability attributes, than were demanded in the past (Peterson, 2009). The environmental impacts of an organization go beyond its own products and processes to include the total immediate and eventual environmental effects of all steps in the supply chain—from the extraction of raw materials, to the use of goods produced, to the final disposal. The proliferation of regulations at every level threatens the ability to operate and market products (Beamon, 1999). Complex supply chains, coupled

with regulations at each step, make it increasingly difficult for companies to meet demands while remaining competitive, and non-compliance can have consequences for all supply chain members. Recently, agriculture has also been challenged with trade-offs between productivity gains and broader sustainability concerns that affect all parts of the supply chain including production, processing, distribution, and consumption (Heller and Keoleian, 2003). A major debate exists over whether or not productivity and sustainability are at odds with each other. Companies and stakeholders often hold the belief that sustainability measures come at the expense of productivity and competitiveness within the industry. By taking into account environmental and social concerns, companies must internalize more costs and face additional constraints. Such arguments make it exceedingly difficult for management to receive the needed support for pursuing sustainable initiatives.

Finally, while the supply chain has the ability to collaborate in the production and distribution of value-added sustainable products and services, certain players in the supply chain have more opportunities to benefit than others. For example, processors and retailers often have much more control over the supply chain than producers whose customers generally consist of intermediate businesses that have less pronounced sustainability motives than end-consumers. In addition, the characteristics of the product or service provided, such as its opportunities for differentiation, determine how much value can be captured by individual companies in the supply chain (Boehlje, Hofing, and Schroeder, 2007).

Conclusion

Sustainability is an issue and an opportunity that cannot be ignored by the agricultural sector. With a number of internal and external pressures present, companies must take action to demonstrate that they are concerned about the future environmental, social, and economic viability of society. However, while there is no authoritative definition of what sustainability means or how it is achieved, each company and industry will have its own approach.

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