Opportunities And Obstacles On The Path To Business Sustainability

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Successful adoption of sustainability principles by an organization depends upon a variety of internal and external conditions. In this study, facilitating and hindering factors in the literature are integrated with results from a cross-industry survey of Sustainability Coordinators. Convergent as well as new insights indicate customer demand, pressure to meet federal regulatory requirements, and peer group support as primary facilitators of sustainable business transformation. Hindering factors include competing organizational priorities and difficulties with quantifying the intangible returns of sustainability strategies. Recommendations emphasize the importance of strategic integration and the need for robust metrics to capture sustainability-related performance outcomes.

INTRODUCTION

Businesses today operate in a far more complex and volatile circumstances than ever before. Challenges such as climate change, energy sourcing, water shortages, contaminants, and other environmental problems demand serious attention and committed action. As major contributors to the crisis, businesses are starting to recognize the need to expand responsibility beyond delivering shareholder value and legal compliance (Carroll, 1991).

The concept of "sustainability" is an alternative to continued environmental degradation. The Brundtland Report defines sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs'' (World Commission on Environment and Development, 1987). In business, sustainability is operationalized as the "triple bottom line" of environmental, social, and economic impact. Transition to a sustainable business model reflects a new normative view of firm performance in which the health and wellbeing of the planet and society are valued in equal measure with the bottom line, both in the present and future (Werther & Chandler, 2010). While the rationale for increasing business sustainability is clear, the process for doing so is less certain. Making the shift toward sustainability requires an openness and willingness to change in fundamental ways. Theoretically, innovation is a critical ingredient for business survival, ensuring the firm's continued relevance to changing trends and needs in the marketplace. However, in practice, a great idea is not sufficient on its own. Innovative "ideation" must be followed up with a rigorous and realistic plan for "execution" (Govindarajan & Trimble, 2010). The hardest part of the innovative process is in its execution, where the devil is in the details of adequately specifying the requirements of how to bring an innovative idea to light.

The focus of this paper is on the significant internal and external factors that help and hinder adoption of sustainable business practices. Many authors provide helpful taxonomies of "what" can be done within the sustainability domain. Bonini and Gorner (2011), based upon McKinsey's survey of sustainability leaders and corporate best practices, outline a variety of sustainability-oriented initiatives and activities that serve waste reduction, fuel efficiency, streamlined logistics and other goals to mitigate negative environmental impact. In their classic text "Green to Gold," Esty and Winston (2006) provide abundant examples and advice for developing an "eco-advantage" with initiatives that reduce waste and increase green value. Such frameworks provide the raw ideation material for populating sustainability plans and report. However, execution guidelines are less articulated with regard to the critical organizational conditions to leverage, circumvent or confront along the way.

This research first provides a literature review of internal and external conditions believed to significantly influence adoption of sustainable practices within an organization. These a priori factors are compared with evidence collected from a cross-industry sample of Sustainability Coordinators in medium to large corporations. The findings reveal where resources and efforts should focus to move the firm from preliminary ideation through successful execution to a more sustainable future.

LITERATURE REVIEW

There is ample speculation of the conditions within an organization that help or hinder execution of sustainability initiatives. The overview provides a prescriptive though somewhat fragmented picture of potential considerations. Following this review, results from local and national surveys of business leaders are compared to these a priori factors to assess convergent validity and to identify new insights.

Strategic Integration

Willingness to integrate sustainability into the strategic planning process is suggested as a key facilitating condition. In theory, a corporate strategy centered on sustainability could serve as a viable option for establishing competitive differentiation (Crittenden, Crittenden, Ferrell, & Ferrell, 2010; Porter & Kramer, 2006). However, it may not be possible or advisable to dedicate the firm's strategy in its entirety to this vision. Bonini & Gorner (2011) note that companies with a robust track record for practicing sustainability are more likely to have integrated its principles into their company goals, mission, and values. Kuosmanen and Kuosmanen (2009) suggest that a focus on sustainability to any degree is a key ingredient in the success of a firm's longterm business strategy.

Ability to Measure Impact

Senior management likelihood to accept sustainability as a worthwhile consideration depends upon the company's ability to measure tangible and intangible value added to the bottom line. Unfortunately, it is difficult to reliably measure the financial return of investments in sustainability (Barnett, 2007). It can difficult to demonstrate value when hard numbers cannot be attached, opening the door to objections to seemingly equivocal allocation decisions. Franklin (2009) suggests that sustainable investment is not always quantifiable, but instead may reflect progress toward a goal of improved cost containment or efficiencies. Reeves, Haanaes, Love, & Levin (2012) define sustainability qualitatively as the ability to adapt to change and to optimize performance across ecological, social, and economic operational spheres during periods of market downturns. Sustainability as a strategic imperative may be best understood in terms of improvements to corporate reputation and brand equity, an intangible value that can lead to highly tangible results if these linkages can be convincingly demonstrated and explained.

Industry Characteristics

Hult (2010) stresses ubiquitous rewards for organizations that pursue market-focused sustainability. Evidence suggests, however, that not all industries are equally suited to emphasize sustainability as a defining feature of the brand, product portfolio, competitive advantage or customer benefit. Resource intensity is a relevant consideration when analyzing the extent of sustainability adoption. Highly resource

intensive industries are subject to greater regulatory pressures that in turn foster adoption of sustainable practices as a "license to operate" (Kiron, Kruschwitz, Haanaes, & von Streng Velken, 2012). Low resource intensive industries are less affected by limits within the physical environment and the uncertainties of regulatory pressures. At the same time, it can be argued that rapid expansion of the sustainability movement has provided all forms of industry with a host of reasons for adopting sustainable practices that go well beyond legal compliance such as improved return on capital, growth opportunities and competitive differentiation (Lubin & Esty, 2010).

Within a given industry, the characteristics of the firm in relation to the industry as a whole may influence how to proceed most effectively. Extreme departures from established brand image and practices might do more harm than good from the consumer perspective. Companies within certain industries may be more likely to adopt sustainability initiatives than others, and may implement this orientation at different rates given the difficulty in measuring its short and long-term value.

Customer Expectations

Many companies may pursue sustainability in response to regulatory requirements, while other companies adopt sustainable practices proactively in order to appeal to increasingly enlightened and demanding customer segments. Porter and Kramer (2006) note that corporate social responsibility represents a competitive advantage for an organization. However, it is increasingly apparent that more customers are beginning to view sustainable practices as a must-have rather than a nice-to-have characteristic (Hillman & Keim, 2001). The demands of current customers as well as the company's growth and expansion goals may foster greater product and service innovation. In a recent Deloitte Briefing (2012), sustainability leaders were reported as 400% more innovative than their less sustainable counterparts. While sustainability was found to foster innovation more than the other way around, it is likely that underlying factors contribute to both propensities. Specifically, a market-orientation in which sensitivity to consumer needs and values is a significant driving force in the company's R&D efforts may be an important antecedent condition for sustainability (Crittenden et al., 2010).

Employee Expertise

The levels and quality of employee knowledge, skills and abilities contribute to the development and ongoing success of sustainable initiatives. It would not be possible to create, introduce, and maintain new practices within an organization without employee commitment and capability to design and carry out these directives (Gullo & Haygood, 2010). Companies must attract employees with appropriate training and experience in sustainability in order to benefit from their creativity and potential for envisioning alternative approaches to conducting critical tasks. Innovative improvements to products, processes, partnerships or other features of the business can only be achieved given the resources that employees have or have access to in order to guide improvements within the firm.

Organizational Culture

Companies with a culture that is aligned with the principles of sustainability are more likely to adopt its practices as compared with companies with more divergent views (Werbach, 2009). Culture is considered to be an enduring climate within the company in which certain types of attitudes and priorities are more positively regarded while discrepant activities would be less likely to engender support. The culture of an organization is an important context when attempting to initiate change, given the need for individual and collective buy-in to ensure that initiatives are understood and accepted.

Internal Coordination

When considering employees across functions and departments, coordination of activities contributes to success. Weak internal coordination can be a major obstacle when undertaking sustainable initiatives within a firm (Darnell, 2008). This lack of interconnectivity is likely to interfere with reliable implementation of new practices, as much as or more than insufficient knowledge, expertise and abilities. Such deficiencies may create an environment in which sustainability priorities are not reliably

communicated and managed, undermining these efforts before they have had a chance to deliver positive outcomes (Bannerjee, 2001).

In sum, the primary factors to consider when assessing the potential for given organization to successfully transition to more sustainable practices are both internal and external in nature. Internal factors include strategic integration, ability to measure impact, employee expertise, organizational culture, and internal coordination. External factors include industry characteristics and customer expectations.

METHOD

Survey Sample

The critical sustainability-adoption factors reviewed above were assessed in a recent survey of Sustainability Coordinators serving in medium to large-sized companies in Southwestern PA. The sampling frame chosen for this local survey is the Champions for Sustainability membership (www.C4S.org). The C4S program is managed by Sustainable Pittsburgh (www.sustainable pittsburgh.org), a non-profit organization dedicated to advancing the mission of living and working sustainably in the region. The C4S group is comprised of professionals with some degree of ownership for introducing and implementing sustainability-oriented initiatives within their respective companies. The C4S membership meets regularly to share their perspective and experiences in their work and to benefit from the organization's programming, resources and expertise regarding sustainable business practices.

The Sustainability Coordinator survey objectives were fourfold: (1) to specify the expected benefits to an organization resulting from improved sustainability practices, (2) to assess outcomes, i.e., the functional areas of the business in which increased commitment to sustainability is taking place, (3) to determine obstacles within the company that interfere with adopting sustainable practices, and (4) to identify the tools and resources found to be most helpful to sustainability managers for achieving targets.

Measures

The survey is comprised of items adapted from secondary sources as well as items developed by the authors (see Appendix). Secondary sources included the surveys of executives and managers of commercial enterprises conducted annually by MIT Sloan School of Business/Boston Consulting Group survey (National Sample #1) and the McKinsey & Company (National Sample #2). Items from these practitioner-oriented investigations were incorporated with permission into the C4S survey to establish external validity of findings for the first three survey objectives of critical benefits, outcomes, and obstacles associated with adopting sustainability. Items developed by the authors addressed the fourth survey objective of identifying critical tools and resources most relied upon by sustainability managers.
Analysis focuses on convergence between local practitioner survey results and the a priori factors reported in the literature as well as additional insights. National practitioner survey results, reported for matching survey items, provide external validation of local practitioner insights and alignment with the a priori factors, as well as new insights for fostering business sustainability.

RESULTS

Sample Comparisons

The Champions for Sustainability (C4S) program membership is comprised of sustainability managers from 50 mid to large-sized companies in the region. After repeated invitation and reminders to C4S members to complete the survey, a total of 14 completed records were obtained, a 28.0% response rate. While more robust response was intended for validation, the sample is representative of the full C4S membership range of job titles, company sizes, industries, and duration of involvement with the C4S program.

The C4S sample is comparable to the MIT/BCG (National Sample #1) and McKinsey (National Sample #2) surveys in terms of company size variation, but has a somewhat different industry

composition. The C4S sample is more oriented toward service and technology industries (low resource intensive industries) while the MIT/BCG and McKinsey samples contain both low and high resource intensive industries such as energy, utility, extraction and automobile manufacturers (see Table 1).

TABLE 1
SAMPLE COMPARISONS

Criteria	Local Sample (C4S)	National Sample #1 (MIT/BCG)	National Sample #2 (McKinsey)
Sample size (N)	14	2,874	2,956
Company Size (employees)	10-100K	10-100K	10-100K
Industries	Finance, healthcare, media, transportation	Energy, high tech, service industries, utilities, consumer products, chemicals, automobiles	Energy, high tech, telecomm, healthcare, retail, transportation, extractive services

Commitment to Sustainability

The regulatory pressures that accompany resource intensity are believed to drive commitment to adopting sustainability (Kiron et al., 2012). However, results indicate that the primarily low resource intensive local practitioner sample and the mixed low/high resource intensive national practitioner sample have a comparable level of commitment to adopting sustainable practices (Local Sample top 3 box = 71.4%, National Sample #1 top 3 box = 68.0%, z-score = .2832, ns (see Table 2).

TABLE 2
COMMITMENT TO SUSTAINABILITY

	Local Sample (N=14)	National Sample #1 (N=2,874)	Z-score mean difference
Top Box %	71.4%	68.0%	.2832

* p < .05; ** p<.01; % = total topbox (5,6,7) ratings / sample size

Perceived Benefits of Sustainability

Local practitioners indicate their most valued benefits are those that increase return on capital, in the form of potential cost savings from improved energy, materials and waste efficiencies (see Table 3). These top ranked benefits are tangible measures of performance that can be captured quantitatively in a relatively straightforward manner and communicated in simple financial terms. Other valued benefits pertain to enhanced growth potential and greater risk management capability. These intangible benefits are harder to quantify and communicate in concrete terms.

The national practitioner sample illustrates a different pattern of valued benefits. More respondents select intangible, difficult to measure growth and reputation-oriented benefits of sustainability as adding the greatest value as compared with the proportion that select tangible outcomes.

TABLE 3
BENEFITS OBTAINED FROM ADOPTION OF SUSTAINABLE PRACTICES

What are the greatest benefits to your company in adopting more sustainable business practices? Please choose up to three key benefits.	Local sample (N=14)	National sample #1 (N=2,874)	Z-Score mean difference
Reduced costs due to energy efficiency	64.3%	22.0%	3.296 **
Reduced costs due to materials or waste efficiencies	57.1%	20.0%	2.804 **
Better innovation of business models and processes	28.6%	19.0%	0.791
Improved brand reputation	28.6%	40.0%	-0.944
Increased competitive advantage	28.6%	22.0%	0.543
Enhanced stakeholder / investor relations	21.4%	13.0%	0.767
Improved perception of how well company is managed	21.4%	26.0%	-0.416
Access to new markets	14.3%	13.0%	0.137
Better innovation of product / service offerings	14.3%	29.0%	-1.567
Improved ability to attract and retain top talent	14.3%	12.0%	0.244
Increased employee productivity	14.3%	7.0%	0.778
Improved regulatory compliance	7.1%	15.0%	-1.136
Increased margins or market share due to sustainability positioning	7.1%	14.0%	-0.992
Reduced risk	7.1%	12.0%	-0.703

* p < .05; ** p<.01; % = total topbox (5,6,7) ratings / sample size

Sustainability Investment Priorities

Local practitioners indicate investment in functional areas that align with the most valued benefits. The top three priorities for sustainability investments are reducing energy use, emissions, and waste; operational improvements that directly tie to tangible measurable cost savings (see Table 4). The next two priorities are more difficult to measure: managing corporate reputation for sustainability and improving employee retention and/or motivation related to sustainability activities. In contrast, the national sample of practitioners, with its more diverse cross-section of industries, revealed a more balanced distribution of operational and reputational investment despite a relatively higher value placed on reputational benefits.

Significant differences are noted for local versus national practitioners reported investment in "improving employee retention and/or motivation related to sustainability activities," with the local sample indicating higher investment than the national sample. The same pattern holds for divergent local versus national sample investments in "reducing emissions from operations."

Barriers to Adopting Sustainability

The most significant barriers to adopting sustainability initiatives are similar when comparing the local and national practitioner samples (see Table 5). The most significant barrier is "difficulty quantifying intangible effects of sustainability strategies (e.g., brand reputation, employee hiring, retention and productivity)." "Competing priorities" rates as the second most significant barrier to adopting sustainability principles, followed by "difficulty capturing comprehensive metrics about sustainability impact of operations."

TABLE 4
TYPES OF SUSTAINABLE PRACTICES

On 7 point scale where 1=significantly declined and 7=significantly improved, how has your company invested in sustainability?	Local Sample (N=14)	National Sample #2 (N=2,956)	Z-Score mean difference
Reducing energy use in operations	85.7%	63.0%	2.400 *
Reducing emissions from operations	85.7%	43.0%	4.530 **
Reducing waste from operations	78.6%	61.0%	1.589
Managing corporate reputation for sustainability	71.4%	51.0%	1.682
Improving employee retention and/or motivation related to sustainability activities	71.4%	26.0%	3.751 **
Managing portfolio to capture trends in sustainability	64.3%	38.0%	2.045 *
Reducing water use in operations	42.9%	38.0%	0.366
Mitigating operational risk related to climate change	42.9%	22.0%	1.574
Committing R&D resources to sustainable products	28.6%	31.0%	-0.200
Leveraging sustainability of existing products to reach new customers or markets	28.6%	28.0%	0.047
Responding to regulatory constraints or opportunities	28.6%	46.0%	-1.436
Managing impact of products throughout the value chain	28.6%	28.0%	0.047
Achieving higher prices or greater market share from sustainable products	21.4%	18.0%	0.312

* p < .05; ** p<.01; % = total topbox (5,6,7) ratings / sample size

TABLE 5
INTERFERING FACTORS PREVENTING ADOPTION OF SUSTAINABLE PRACTICES

What are the obstacles within your company that interfere with its commitment to sustainability? Please choose the three most significant obstacles.	Local Sample (N=14)	National Sample #1 (N=2,874)	Z-Score mean difference
Difficulty quantifying intangible effects of sustainability strategies (e.g., brand reputation, employee hiring, productivity)	64.3%	46.0%	1.424
Competing priorities	57.1%	37.0%	1.519
Difficulty capturing comprehensive metrics about sustainability impact of operations	35.7%	33.0%	0.211
Lack of financial incentives for considering sustainability	28.6%	19.0%	0.791
Opposition from executives or influential individuals	21.4%	12.0%	0.858
Difficulty quantifying sustainability-related risks	21.4%	25.0%	-0.325
Lack of model for incorporating sustainability in business cases	21.4%	30.0%	-0.779
Difficulty predicting customer response to sustainability strategy	14.3%	26.0%	-1.248

* p < .05; ** p<.01; % = total topbox (5,6,7) ratings / sample size

Resources for Adopting Sustainable Practices

The local practitioner sample rated the tools and resources found to be most helpful when attempting to implement sustainability initiatives within their respective organizations. This question was not included in the national practitioner surveys; findings represent preliminary exploration on this topic. Managers rated "peer events" as the most helpful resource, a very clear reflection of the highly effective programming available through Sustainable Pittsburgh. The C4S consortium enables the "owners" of sustainability within their organizations to come together to share best practices and to develop collaborative solutions for overcoming obstacles they encounter (see Table 6). The other highly valued resources for supporting sustainability efforts are "customer demands" and "federal regulatory requirements."

TABLE 6
RESOURCES FOR ADOPTING SUSTAINABLE PRACTICES

On 7 point scale where 1=little influence and 7=strong influence, please indicate the extent to which the following has assisted your efforts to adopt sustainable practices in your organization	Mean
Peer events	5.11
Customer demands	4.67
Federal regulatory requirements	4.00
Regional funding programs	3.94
State regulatory requirements	3.89
Other professional organizations	3.78
Local government regulatory requirements	3.56
Other regional nonprofits	3.44
Regional university programs	3.33
Supply chain demands	3.33
Sustainability publications/literature	3.22
Non-regional university programs	2.89

DISCUSSION AND CONCLUSIONS

The literature identifies factors to consider when assessing the potential for given organization to successfully transition toward greater sustainability. Internal factors include strategic integration, ability to measure impact, employee expertise, organizational culture, and internal coordination. External factors include industry characteristics and customer expectations. The practitioner survey results provide validation of prescriptive findings as well as some new insights.

First, uniformly high commitment to sustainability is indicated, suggesting that high resource intensity, as highlighted in the literature review, may still serve as a powerful incentive for adopting sustainable operations. Additional forces for change may be operating within low resource intensive firms as well. The findings suggest the emergence of sustainability as a universal business "megatrend" that is steadily encroaching on operations and practices regardless of the nature of the industry or stakeholder groups served (Lubin & Esty, 2010).

Second, some discrepancies were noted in the types of benefits most valued within the local versus the national samples of practitioners. The local sample of practitioners tended to value tangible outcomes

while the national sample of practitioners tended to value intangible outcomes. It is possible that the national sample contains more early adopters of sustainable practices as compared with the local sample given its composition of both low and high resource intensive industries. Experience with sustainable practices may lend itself to more advanced capabilities for assessing both quantitative and qualitative (i.e., tangible and intangible) impact. Future research should examine whether the relative importance of tangible benefits shifts to intangible benefits over time as firms gain experience and sophistication with assessing the full scope of sustainability outcomes.

Third, discrepancies were noted in the types of investment prioritized by the local versus the national samples of practitioners. The local sample indicated greater investment in functional areas directly tied to their most valued tangible (operational) outcomes, while the national sample revealed a more balanced distribution of tangible (operational) and intangible (reputational) investment despite greater value placed on intangible benefits. The findings suggest imperfect alignment between valued outcomes and the extent of investment that a company is able or willing to make. It is not known whether investing in building the firm's reputation is simply less costly, if there are fewer options available, or if intangible goals lack internal support. In terms of a priori factors, strategic integration may play a role in determining the extent of investment that a company is willing to make given the prominence of sustainability principles in the company's stated goals and mission (Bonini & Gorner, 2011; Kuosmanen and Kuosmanen, 2009). The difficulty of measuring intangible outcomes may also deter significant investment in initiatives that solely target reputation and image improvement for reasons to be discussed further below.

Local practitioners report relatively greater investment as compared with national practitioners in "improving employee retention and/or motivation related to sustainability activities." It is possible that spending levels in this area within the national sample is already substantial and does not require any increase as compared to spending within the local sample. It is also possible that more established sustainability agendas exist within the diverse mix of industries represented in the national sample, which in turn fosters an employee culture that is aligned with the principles of sustainability (Werbach, 2009). Companies that have not progressed as far with implementation of sustainability principles may require greater investment and intervention to socialize employees and other internal stakeholder groups to support a cultural shift. Divergent local versus national sample investments in "reducing emissions from operations" may reflect different investment choices given the specific industries represented, the length of time that sustainability has been pursued, the degree to which emissions can be further reduced, or other conditions that cause priorities to change over time.

Fourth, the greatest barriers to adopting sustainability within an organization uniformly pertain to difficulties associated with capturing, communicating, and convincing others of the benefits to be gained by adopting sustainability principles. These findings corroborate the assertions made by Barnett (2007) and Franklin (2009) of pervasive measurement difficulties. Other a priori factors in the literature are implicated as well. For example, a focus on sustainability can serve as a competitive advantage and makes a substantial contribution to a company's long term success (Bonini & Gorner, 2011; Crittenden et al., 2010). However, the "competing priorities" barrier suggests relatively weaker emphasis on sustainability principles in the company goals, mission, and/or values as compared with other issues. Internal coordination across the organization is likely to be impacted by a low priority placed on engaging in sustainable activities, as suggested by Bannerjee (2001). The organizational culture as a whole is not likely to engender support for sustainability if such attitudes and priorities are not recognized and rewarded (Werbach, 2009). The inability to quantify sustainability initiatives may be the most significant issue to address with intervention, as it suggests the underlying explanation for the lack of priority placed in sustainability initiatives.

The "competing priorities" barrier is particularly provocative, as it depicts the losing battle often fought by practitioners when competing for finite resources against other worthy causes. A vivid image is suggested where a classic business case that presents quantifiable business value is far more likely to "win" against a case containing intangible benefits that are inadequately represented, unfamiliar and unproven. Two solutions are possible for resolving this dilemma. On the one hand, practitioners can try to find better measurement methods for capturing intangible outcomes in quantitative terms to fit the

traditional definition of business value. This is a logical but possibly fruitless option due to the many unknowns that may prevent explicit operationalization of intangible benefits. Alternatively, practitioners can revise and expand the traditional approach to building a business case. Alternative definitions of business value may be possible to allow for the full scope of inexact yet valuable short term and longterm outcomes to be conveyed. Future research can address the relative merits of these options to determine the most effective means for advancing a sustainability agenda given these measurement and prioritization challenges.

"Lack of individual financial incentives for considering sustainability" is another highly significant barrier to adopting sustainability within both the local and national practitioner samples. However, the lack of individual financial incentive to commit to changing one's attitudes, intentions and behaviors is rated as a significant hindrance, and might be attributed again to the low priority on adopting sustainability practices relative to other organizational objectives. In general, an organization that does not reward a given type of behavior is not likely to see it take place. The survey findings suggest that contingent rewards may be lacking in many organizations, thus undermining progress toward this goal.

Lastly, the most valued resource within the local practitioner sample is peer events. This finding suggests that collaboration within a like-minded community serves an important function for building efficacy, enhancing creativity and competency required to successfully initiate change. The issue of camaraderie is an interesting consideration when one considers the common practice within companies to simply assign one or more employees to the task of championing sustainability change efforts. This charge may require access to a network of contacts with whom to share experiences, frustrations and tips for success in order to stay the course. The value of an interactive and productive group aligns with the need for employee expertise, as suggested by Gullo and Haywood (2010). Employee education is needed to ensure that an organization is populated with individuals who can both generate ideas and put them into action, the two critical phases of innovation (Govindarajan & Trimble, 2010).

High value placed on customer demand as an input for determining what are how to implement sustainable practices signifies the strong market-orientation within the local practitioner sample. These results are consistent with Hillman and Keim (2001) who identify growing customer demand for sustainable products and services as a significant driver of change. It would be helpful to know if customer demands originate from current customers served or prospective customer segments targeted for market development. Federal regulatory requirements were rated as a highly important resource but not at a uniformly high level across the sample. Variation may be due to different levels of scrutiny on sustainability–related performance factors by industry, as suggested by Kiron et al. (2012). Overall, these local practitioner results indicate reliance on external input for direction and guidance. These choices may be preferred by less experienced and established entities with a less established sustainability agenda and strategy; future research should compare these findings with a robust national sample of practitioners to determine the most helpful resources at all stages of sustainability adoption.

In conclusion, the sustainability revolution is a phenomenon that is taking a decisive hold on business practices. The impeding challenges must be confronted on a personal and collective level to curtail further irreparable harm to the environment. Industry plays a leading role in making the transition to a more ecologically sustainable quality of life, starting with making improvements to its own triple bottom line of performance metrics. This research identifies significant hurdles that must be overcome by businesses to successfully navigate the challenges ahead, by fostering support while mitigating obstacles in the effort to adopt more sustainable and humane business practices.

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APPENDIX:
SUSTAINABILITY COORDINATOR OUTCOME SURVEY

Please answer the following questions in this brief survey that address sustainable practices within your organization. This survey is anonymous. No identifying information is collected and no individual responses can be linked to your identity or to the identity of your organization. All responses are analyzed in aggregate in order to benchmark the sustainability needs, goals and performance levels of industry in the region.

1. How has your organization's commitment to sustainability — in terms of management attention and investment — changed in the past year? Please circle the option that best describes your company's sustainability commitments in the past year.

Commitment Significantly Declined			No Changes			Commitment Significantly Improved	Don't Know
1	2	3	4	5	6	7	0

2. What kinds of changes have taken place within your company within the past year? Please rate whether your company's investment in sustainability has improved, declined or not changed within each functional area in the past year.

	Commitment Significantly Declined			No Changes			Commitment Significantly Improved	Don't Know
Reducing energy use in operations	1	2	3	4	5	6	7	0
Reducing waste from operations	1	2	3	4	5	6	7	0
Managing corporate reputation for sustainability	1	2	3	4	5	6	7	0
Responding to regulatory constraints or opportunities	1	2	3	4	5	6	7	0
Reducing emissions from operations	1	2	3	4	5	6	7	0
Managing portfolio to capture trends in sustainability	1	2	3	4	5	6	7	0
Reducing water use in operations	1	2	3	4	5	6	7	0
Committing R&D resources to sustainable products	1	2	3	4	5	6	7	0
Leveraging sustainability of existing products to reach new customers or markets	1	2	3	4	5	6	7	0
Managing impact of products throughout the value chain	1	2	3	4	5	6	7	0
Improving employee retention and/or motivation related to sustainability activities	1	2	3	4	5	6	7	0
Mitigating operational risk related to climate change	1	2	3	4	5	6	7	0
Achieving higher prices or greater market share from sustainable products	1	2	3	4	5	6	7	0

3. Has considerations of sustainability caused your company to increase its collaboration with any of the following? (Please choose all that apply)
   - ☐ Non-government organizations (NGOs)
   - ☐ Governments / policy makers
   - ☐ Industry associations
   - ☐ Competitors
   - ☐ Customers
   - ☐ Internal business units across geographies
   - ☐ Internal business units across functions
   - ☐ Suppliers
   - ☐ Contractors
   - ☐ Local communities affected by operations along the supply chain
   - ☐ None of the above

4. What are the greatest benefits to your company in adopting more sustainable business practices? Please choose up to three key benefits.
   - ☐ Access to new markets
   - ☐ Better innovation of business models and processes
   - ☐ Better innovation of product / service offerings
   - ☐ Enhanced stakeholder / investor relations
   - ☐ Improved brand reputation
   - ☐ Improved perception of how well company is managed
   - ☐ Improved regulatory compliance
   - ☐ Improved ability to attract and retain top talent
   - ☐ Increased competitive advantage
   - ☐ Increased margins or market share due to sustainability positioning
   - ☐ Increased employee productivity
   - ☐ Reduced costs due to energy efficiency
   - ☐ Reduced costs due to materials or waste efficiencies
   - ☐ Reduced risk
   - ☐ Other: _____

5. What are the obstacles within your company that interfere with its commitment to sustainability? Please choose the three most significant obstacles.
   - ☐ Opposition from executives or influential individuals
   - ☐ Difficulty quantifying intangible effects of sustainability strategies (e.g., brand reputation, employee hiring, retention and productivity)
   - ☐ Difficulty predicting customer response to sustainability strategies
   - ☐ Lack of individual financial incentives for considering sustainability
   - ☐ Difficulty capturing comprehensive metrics about sustainability impact of operations
   - ☐ Difficulty quantifying sustainability-related risks
   - ☐ Lack of model/framework for incorporating sustainability in business cases
   - ☐ Competing priorities
   - ☐ Uncertainty about future carbon pricing
   - ☐ Other: _____

6. Please indicate the extent to which the following sources have motivated the adoption of sustainability practices in your organization.

	Minimal Influence			Moderate Influence			Strong Influence	Don't know
Federal regulatory requirements	1	2	3	4	5	6	7	0
State regulatory requirements	1	2	3	4	5	6	7	0
Local government regulatory requirements	1	2	3	4	5	6	7	0
Customer demands	1	2	3	4	5	6	7	0
Supply chain demands	1	2	3	4	5	6	7	0
Sustainable Pittsburgh events	1	2	3	4	5	6	7	0
Meetings with other Sustainability Coordinators	1	2	3	4	5	6	7	0
Other professional organizations	1	2	3	4	5	6	7	0
Other regional nonprofits	1	2	3	4	5	6	7	0
Regional funding programs	1	2	3	4	5	6	7	0
Regional university programs	1	2	3	4	5	6	7	0
Non-regional university programs	1	2	3	4	5	6	7	0
Sustainability publications	1	2	3	4	5	6	7	0

7. Please provide a brief example of a sustainability-related practice you adopted from past sustainability coordinator interactions and workshops. (open-end)

8. What have been the environmental and economic impacts as a result of your implementation of the practice described above? Please be as quantitative as possible. (open-end)

9. Please choose the industry category that best describes your company.
   - ☐ Academia / higher education
   - ☐ Automobiles
   - ☐ Chemicals
   - ☐ Commodities
   - ☐ Conglomerate / Multi-industry
   - ☐ Construction
   - ☐ Consulting / Professional services
   - ☐ Consumer products
   - ☐ Energy and utilities
   - ☐ Financial services
   - ☐ Healthcare
   - ☐ Industrial goods and machinery retail
   - ☐ Industrial services
   - ☐ Media and entertainment
   - ☐ Non-profit
   - ☐ Public sector / government
   - ☐ Technology and telecommunications
   - ☐ Other

10. Which of the following best describes your current position?
    - ☐ C-suite executive (e.g. CEO, CSO, CFO)
    - ☐ Sustainability Manager
    - ☐ Manager
    - ☐ Academic
    - ☐ Non-profit executive
    - ☐ Government staff
    - ☐ Other: _____

11. What is your organization's total headcount? Please choose from the following ranges.
    - ☐ < 50
    - ☐ 50 – 199
    - ☐ 200 – 999
    - ☐ 1,000 – 9,999
    - ☐ 10,000 – 99,999
    - ☐ 100,000+

Thank you for your feedback.