

**Developing Sustainable Supply Chains:
An Organizational and Supply Chain Employee View**

Sponsor:

Center for Industrial Research and Service (CIRAS)

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July 2012

The Center for Industrial Research and Service (CIRAS) provides applied research, education, and technical assistance to Iowa industry through partnerships with Iowa's universities, community colleges, and government agencies. Assistance is supported in part by the DoC/NIST Hollings Manufacturing Extension Partnership, the DoD/DLA Procurement Technical Assistance Program, the DoC/EDA University Center Program, and the USDA BioPreferred Program.

This report was prepared under awards from the U.S. Department of Commerce, Economic Development Administration and the National Institute for Standards and Technology, Hollings Manufacturing Extension Partnership.

This publication was prepared by the Center for Industrial Research and Service. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the Department of Commerce.

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Recently, the issue of sustainability has become a key element in supply chain management because firms are recognizing that a sustainable supply chain can lead to a source of competitive advantage. A sustainable supply chain is one that performs well on traditional measures of profit and loss as well as on social elements. Such a conceptualization of performance is generally referred to as the triple bottom line – people, planet and profit. This triple bottom line is in response to growing stakeholder pressure on businesses to pay more attention to the environmental and resource consequences of the products and services they deliver to meet customer demand and government regulations.

An emerging area of interest among practitioners is on how to promote employee participation in environmental activities within an organization. Gaining employee commitment to environmental projects represents a significant challenge to many organizations because employees are faced with many other competing demands for their time. Without employee commitment and engagement to environmental projects, organizations will face a difficult time developing sustainable supply chain practices.

The purpose of this study is to develop a better understanding of current sustainable supply chain practices and future sustainable supply chain opportunities for local businesses in Iowa. Specifically, the objectives of this study are to:

- Provide an overview of the best practices regarding environmentally-focused employee participation that organizations are adopting in the area of sustainable supply chains
- Assess the current sustainable pressures and organizational environmental commitment among Iowa companies that responded to our sustainable supply chain survey
- Examine both organizational and employee environmental behaviors
- Make recommendations on how CIRAS member companies can improve sustainable supply chain behavior

Problem Statement

Approximately 50 percent of chief executive officers who responded to a Pricewaterhouse Coopers sustainability survey are changing their sustainability strategies in order to respond to stakeholder pressure to become more environmental conscious companies (PwC 2011). This perspective is consistent with Wal-Mart Corporation's \$30 million financial investment to encourage their employees to engage in environmental behaviors. A joint MIT and Boston Consulting Group study and a recent National Association of Environmental Managers report how employee interest in sustainability matters can have a tremendous impact not only on overall business performance but also employee satisfaction and turnover intentions

(Berns et al., 2009; NAEM 2009). It is not surprising, then, that studies which examine employee involvement in sustainability is a topic of significant interest.

We also believe a need exists to revisit the concept of sustainable supply chains with a particular attention to both the organizational and employee level factors that could encourage employees to engage in more environmental behaviors. This study will document factors that are influencing Iowa firms to pursue sustainability activities. We will focus on several important factors including stakeholder pressures to act “green,” organizational level sustainable factors such as trade-offs between sustainable and revenue goals, and overall environmental organizational performance. We will then examine employee-level factors such as pressure to engage in environmental behaviors, perceptions of supervisory support and commitment to engage in environmental behaviors, and individual engagement in environmental behaviors.

Methodology

Survey development

We conducted a survey to examine the organizational and individual level environmental practices among Iowa manufacturing firm. We developed our survey by soliciting input and feedback from academic experts and practitioners who are actively involved in environmental management initiatives. We also reviewed the academic and industry environmental management literature.

Survey administration

Our survey was distributed to the corporate members of a mid-west University's industrial and research service organization. Because of the potential for a low survey response rate, we notified in advance 269 potential manufacturing professionals by phone about our survey. To do so, we hired and trained undergraduate students to telephone and email potential survey respondents based on the contact information contained in the mid-west University's database. Our survey respondents were motivated to participate in this study because they actively engage with CIRAS. Our student research assistants also made follow-up telephone calls and sent reminder emails about our study. Additionally, to encourage participation in the research project, we offered a summary of the results to the survey respondents.

Sample

The initial population for the survey was senior-level corporate members of a mid-west University's industrial and research service organization database. Of those respondents that we were able to contact by telephone, 43 respondents were no longer employed by their organization or were not reachable by telephone or email because of either bad email addresses or the phone numbers derived from the database. A total of 228 potential senior-level managers received an emailed link to the survey. We received 72 responses, resulting in a response rate of approximately 31.58% (72/228).

Because we are also interested survey responses from lower-level employees within the same organization that initially received the survey, we requested from the senior-level managers the names of three of their direct reports. A total of 228 potential senior-level managers received an emailed link to the survey. Of those senior-level managers who provided us with the names and email address of their direct reports, we received a total of 85 direct report responses, resulting in a response rate of approximately 37.61% (85/226).

Eighty-three percent of the senior level managers are males. On average, a senior-level manager is 50.49 years old. Within the direct report sample, eighty-eight percent are male. On average, a direct report employee is 47.57 years old. The firms in our sample have over \$170 million in annual sales, on average.

Measurement of variables

We now turn to describing the variables used in this study. Our first variable is the percent of suppliers engaging in sustainability practices. Similarly, our second variable is the percent of customers engaging in sustainability practices. Both constructs are metric variables and are shown in Table 1. Our next set of items, as depicted in Table 2, assesses the extent to which suppliers and customers push the focal firm to pursue sustainability practices. An example item is: “Our suppliers push for sustainable practices more than we do.” These survey items are measured on a scale from one to nine (1=Not at all; 9=To a very large extent). Next, we include items designed to assess stakeholder pressure to act green. On a scale from 1 to 7 (1=Not at all; 7=Very strongly), we asked the key informants to what extent does the organization feel pressure from the stakeholders listed in Table 3 to implement environmental programs.

Table 4 presents the items in our environmental/revenue trade-off construct. We asked our senior managers their opinion on possible trade-offs between company revenue generation and the pursuit of environmental practices using a 6 point response format (1=Strongly Disagree=6=Strongly Agree). A sample item is: “Sound environmental practices suffer when my company focuses on revenue goals.” Lastly, in this category we examined the company’s environmental performance using six items on a 1 to 10 response format (1=Not at all; 10=To a very large extent). A sample is: “Forecast demand for time-sensitive products accurately”.

We will now describe the items that examine senior manager sustainability factors. The first construct in this category is a senior manager’s commitment to environmental practices. As shown in Table 6, we examined four items that are derived from this construct including: “I am willing to put in a great deal of effort beyond what is normally expected in order to make my plant’s environmental practices successful.” Respondents responded to these items using a 7-point response format (1=Strong disagree; 7=Strongly agree). Next, presented in Table 7, we examined a senior manager’s cavalier attitude toward environmental behaviors using a 7-point response format (1=Very often; 7=Never). A sample item is: “You can do your job without having to comply with environmental practices?” Similarly, we also examined a senior manager’s willingness to sacrifice for the environment as presented in Table 8. We measured these items using a 8-point scale (1=Not at all; 8=Completely Agree). A sample item is: “I am

willing to give things up that I like doing if they harm the natural environment.” Our last item in this category is a senior manager’s sustainability behaviors. This is a metric item, and we asked the key informant over the past 12 month, three questions: percent of your work time was spent on preventing environmental problems from occurring; what percent of your work time was spent on new environmental projects; and what percent of your work time was spent on on-going environmental project?

We now describe the items that examine the supply chain employee sustainability factors. Our first factor is supply chain employee pressure to engage in environmental behaviors. The two factors which we capture in our survey are show in in Table 10; namely, I feel pressure to comply with sound environmental practices, and I feel pressure to make my plant environmentally responsible. Key informants answered these questions using a one to seven response format (1=Strongly disagree; 7=Strongly agree).

We also examined a supply chain employee’s perception of supervisory support of environmental (POS) behaviors and are shown in Table 11. We employed a seven-point response format (1=Strongly disagree; 7=Strongly agree). An example item is: My direct supervisor is willing to assist me in solving environmental problems. Similarly, we also assessed the perception of environmental commitment among senior managers using a seven-point response format (1=Strongly disagree; 7=Strongly agree). We operationalized this construct using items such as: My direct supervisor talks up environmental projects and activities.

We now turn to describing our measures which were used to assess sustainability behaviors among the supply chain employee sample. One construct in this category is a senior manager’s sustainability behaviors. This is a metric item, and we asked the key informant over the past 12 month, three questions: percent of your work time was spent on preventing environmental problems from occurring; what percent of your work time was spent on new environmental projects; and what percent of your work time was spent on on-going environmental project? Similarly, we also examined the supply chain employee’s sustainability behaviors based on the individual’s involvement in environmental behavior over the past 12 months). An example item is: I look for opportunities to reuse physical materials (e.g., salvage materials from returned products). All items are measured using a nine point response format (1=Never; 9=Frequently).

Summary of Key Findings

Our analysis begins by examining the five main organizational level sustainability factors identified in the survey: stakeholder pressures to act green, sustainability across the supply chain, environmental opportunities, environmental-revenue trade-offs, and environmental performance. We will then turn to examining the senior manager level sustainability factors and behaviors. Finally, employee-level sustainability factors that were contained in the direct report version of the survey will be presented. As noted earlier, we developed these categories of factors after a careful review of the supply chain sustainability literature. For the organizational level factors, we asked a senior level manager to respond to our survey questionnaire about these items.

Organizational Level Sustainability Factors

Our first organizational level sustainability factor is supply chain partners who are engaged in sustainability practices. As Sarkis et al (2010) point out external forces often cause stakeholders to increase pressure on companies to reduce negative impacts and increase positive ones. In our study, we attempted to measure the influence of supply chain partners on a focal firm to engage in sustainability practices in three distinct ways. Our first examination consists of examining the extent to which suppliers and customers are engaged in sustainability practices. As shown in Table 1, we find that approximately 84 percent of a focal company's suppliers and customers are engaged in at least some sustainability practices. Somewhat surprisingly, we find that only two percent of our sample has companies who are fully engaged in sustainability practices.

Table 1: Percent of Supply Chain Stakeholders Engaged in Sustainability Practices

	% > 0	mean > 0%	0 to 5%	5 to 25 %	25 to 50 %	50 to 75%	75 to 99%	100%
Item	Engaged	Engaged	Minimal Engagement	Partial Engagement	Moderate Engagement	Above Average Engagement	Substantial Engagement	Full Engagement
Percent of Suppliers Engaging in Sustainability Practices	83.50%	35.48%	1.60%	40.70%	43.03%	8.14%	6.98%	0.00%
Percent of Customers Engaging in Sustainability Practices	84.47%	40.8.%	1.50%	36.79%	41.38%	12.65%	57.50%	2.30%

Our second organizational level sustainability factor is the importance of sustainable supply chain practices among suppliers and customers. Specifically, we asked our survey informants to assess how important it is among suppliers and customers that the focal firm pursues sustainability practices. Table 2 presents the specific items for this factor. As shown, focal firms in our sample are not under tremendous pressure to pursue sustainability practices. Indeed, most of the focal firms are not under much pressure from suppliers (70 percent) and face only a moderate amount of pressure from customers (50 percent).

Table 2: Assessment Among Suppliers and Customers that the Focal Firm Pursues Sustainability Practices

Item	Mean	Std. Dev.	% > None	None to a Moderate Level (1 to 4)	Moderate level to Substantial Level (5 to 8)	To a very large extent (9)
Our suppliers push for sustainable practices more than we do.	3.61	1.65	85.92%	70.42%	29.58%	0.00%
We are driven by our major (powerful) supplier to pursue sustainability practices.	3.16	1.88	75.71%	74.30%	25.71%	0.00%
Our customers push for sustainable practices more than we do.	4.76	2.10	91.55%	45.07%	52.10%	2.82%
We are driven by our major (powerful) customer to pursue sustainability practices.	4.25	2.32	84.51%	52.11%	45.07%	2.82%

We now turn to examining our third organizational level sustainability factor; namely, stakeholder pressure to act green. Because the source of stakeholder pressure is derived from both external and internal forces, we designed this factor to measure the influence of multiple parties. Table 3 presents our results. We find that shareholders, sustainability managers, and employees are the three largest entities that exert pressure on an organization to pursue sustainability practices. Indeed, we find that shareholders (directors and above), sustainability managers, and employees have a very large influence on these matters (36.4%, 6.42%, and 2.7% respectively).

Table 3: Stakeholder Pressure to Act Green

Item	Mean	Std. Dev.	% > None	None to a Moderate Level (1 to 4)	Moderate level to Substantial Level (5 to 8)	To a very large extent (9)
Shareholders (directors and above)	4.15	1.67	92.73	32.72%	63.63%	36.40%
Employees	4.01	1.42	97.30	35.13%	62.16%	2.70%
Community organizations/(e.g., Chamber of Commerce)	3.41	1.40	89.19	49.55%	50.46%	0.00%
Trade associations	3.48	1.52	90.99	51.35%	48.64%	0.00%
Sustainability managers	3.76	2.05	77.06	42.20%	51.38%	6.42%

Our next organizational level factor is environmental/revenue tradeoff. We define this as the conundrum that an organization faces when deliberating about sustainability practices. As presented in Table 4, the firms in our sample do not believe that they have to sacrifice revenue goals in place of pursuit of sustainability goals. Approximately 80 percent of those key informants who responded to our questionnaire indicated that environmental/revenue trade-offs exist.

Table 4: Environmental/Revenue Tradeoff

Item	Mean	Std. Dev.	% > Strongly Disagree	Strongly Disagree to Neutral (1 to 3)	Agree to Strongly Agree (4 to 5)
Sound environmental practices suffer when my company focuses on revenue goals.	2.35	0.90	82.88	90.09	9.91
Meeting revenue goals and environmental goals at the same time is difficult.	2.56	0.99	85.59	78.38	21.62
Environmental goals and revenue goals are in often conflict with each other.	2.59	1.00	87.39	76.57	23.42
Trade-offs exist when pursuing revenue and environmental goals.	3.11	1.03	89.19	54.05	45.95

Our final organizational level factor is environmental performance. We asked our key informants to report on the extent of their current environmentally-focused activities across a broad array of items. We discovered that many of the firms in our sample are actively involved in several of the environmental activities listed in Table 5. For example, over 24 percent of the sample fully sources materials from local vendors that are used in their plant. Approximately, over 90 percent of the sample at least minimally forecasts demand for time-sensitive products accurately or have programs in place to reduce the materials used in the production process.

Table 5: Environmental Performance

Item	Mean	Std. Dev.	% > None	Not at all to a minimal level (1 to 3)	Minimal level to Partial Level (4 to 6)	Partial level to Substantial Level (7 to 9)	Full Level (10)
Source materials from local vendors that are used in your plant.	7.74	2.21	99.10%	5.40%	17.12%	53.15%	24.32%
Have energy-efficient water-usage practices in place.	5.94	2.29	98.20%	21.62%	36.04%	39.64%	2.70%
Forecast demand for time-sensitive products accurately.	6.35	2.21	97.30%	9.90%	34.23%	46.85%	9.01%
Find uses for items that are about to reach their end-of-product life date.	6.17	2.35	96.40%	15.31%	36.04%	44.15%	4.50%
Have programs in place to reduce your materials used.	6.71	2.61	93.69%	14.41%	19.82%	47.74%	18.02%
Engage in activities to reduce your carbon footprint.	5.54	2.64	90.99%	27.93%	30.63%	33.34%	8.11%

Senior Manager Level Sustainability Factors

Our first senior manager level sustainability factor is the senior manager’s commitment to environmental practices. As shown in Table 6, many of the senior managers who responded to our questionnaire are highly committed to the pursuit of environmental management initiatives. Indeed, over 60 percent of the senior managers agree or strongly agree that they are willing to put forth a great deal of effort towards making environmental practices successful in their organizations.

Table 6: Senior Manager's Commitment to Environmental Practices

Item	Mean	Std. Dev.	% > None	Disagree	Neutral	Agree
I am willing to put in a great deal of effort beyond what is normally expected in order to make my plant's environmental practices successful	4.74	1.26	99.10%	18.92%	19.82%	61.26%
Company practices that support the environment inspires me to do the best job possible	4.64	1.36	90.99%	19.82%	26.13%	54.05%
I believe that more practices that support the environment would be beneficial to our facility	4.93	1.38	99.10%	11.71%	29.73%	58.56%
I am open to implementing plant level environmental initiatives	5.63	0.88	99.10%	1.80%	3.60%	94.59%

Our next senior manager sustainability factor is the senior manager's cavalier attitude toward environmental behaviors. The results in Table 7 show that the senior managers in our sample largely (80 percent) do not believe that environmental practices are not the latest fad. Moreover, these managers do not believe that environmental practices are a waste of time (88 percent).

Table 7: Senior Manager's Cavalier Attitude Toward Environmental Behaviors

Item	Mean	Std. Dev.	% > Never	Not at all to a minimal level (1 to 3)	Minimal level to Often (4 to 6)	Very Often (7)
You can do your job without having to comply with environmental practices?	3.17	1.57	84.40%	60.56%	35.78%	3.67%
You can ignore your company's environmental practices if you are trying to save time?	2.18	1.27	63.06%	84.69%	14.42%	9.00%
Environmental practices are not a necessary aspect of your job?	2.74	1.69	76.58%	73.87%	20.72%	5.41%
That adhering to environmental practices is a waste of time?	2.13	1.13	70.27%	88.29%	9.91%	1.80%
Environmental practices are the latest management fad?	2.4	1.36	70.00%	81.82%	17.27%	9.10%

Our last senior manager level sustainability factor is the senior manager’s willingness to sacrifice for the environment. As reflected in Table 8, most of the senior managers are willing to do what is best for the environment (84 percent). However, very few of the survey respondents are completely willing to go out of there way for environmental activities (12 percent).

Table 8: Senior Manager’s Willingness to Sacrifice for the Environment

Item	Mean	Std. Dev.	% > Do Not Agree	Not at all to a minimal level (1 to 4)	Minimal level to Often (5 to 7)	Completely Agree (8)
I am willing to give things up that I like doing if they harm the natural environment.	6.00	1.23	99.02	9.8	84.31	5.88
I am willing to take on responsibilities that will help conserve the natural environment.	6.53	0.92	99.02	1.96	91.17	6.86
I am willing to do things for the natural environment, even if I am not thanked for my efforts.	6.73	0.81	99.02	0.98	87.25	11.76
Even when it is inconvenient to me, I am willing to do what I think is best for the environment.	6.44	1.12	99.02	5.88	84.31	9.80
I am willing to go out of my way to do what is best for the environment.	6.24	1.25	99.00	8.00	80.00	12.00

Senior Manager Level Sustainability Behaviors

We now turn to examining sustainability behaviors among the senior manager sample. Table 9 depicted three types of sustainability behaviors: percent of work time spent on preventing environmental problems from occurring; percent of work time spent on new environmental projects; and percent of work time spent on on-going environmental projects. We find that a minimal to partial amount of time is spent on all three of these activities. Specifically, the majority of our sample exerts a minimal or partial time on environmental projects.

Table 9: Senior Manager’s Sustainability Behaviors

					Level of Engagement					
					Minimal	Partial	Moderate	Above Avg	Substantial	Full
Item	Mean	Std. Dev.	% > 0	mean > 0%	0 to 5%	5 to 25 %	25 to 50 %	50 to 75%	75 to 99%	100%
What percent of your work time was spent preventing environmental problems from occurring?	6.33	7.26	81.73	7.74	56.48	43.54	0	0	0	0
What percent of your work time was spent on new environmentally-friendly projects?	7.55	10.68	77.88	9.69	65.43	23.45	11.11	0	0	0
What percent of your work time was spent on on-going environmentally-friendly projects?	7.81	11.64	76.92	10.15	60	26.25	17.5	0	0	0

Supply Chain Employee Perception of Organizational Influence on Sustainability Activities

We will now focus on describing the supply chain employee’s perception of the organization’s influence on sustainability activities. The first factor within this domain is the supply chain employee’s felt pressure to engage in environmental behaviors. Our findings in Table 10 show that over 60 percent of the supply chain employees feel pressure to comply with sound environmental practices.

Table 10: Supply Chain Employee Pressure to Engage in Environmental Behaviors

Item	Mean	Std. Dev.	% > Never	Disagree (1 to 3)	Neutral - 4	Agree (5 to 7)
I feel pressure to comply with sound environmental practices.	4.84	1.63	62.5	21.25	16.25	62.5
I feel pressure to make my plant environmentally responsible.	4.99	1.56	67.5	16.25	16.25	67.5

Our next important factor is the supply chain employee’s perception of supervisory support of environmental behaviors. As shown in Table 11, there is large agreement among the supply chain employees in this sample that the individual’s supervisor is supportive of environmental behaviors. For example, over 66 percent of the employees report that their supervisor is willing to provide help/assistance on environmental problems.

Table 11: Perception of Supervisory Support of Environmental Behaviors

Item	Mean	Std. Dev.	% 5 or higher	Disagree (1 to 3)	Neutral - 4	Agree (5 to 7)
My direct supervisor values environmental practices.	5.67	0.88	64.2	2.47	6.17	64.2
Help is available from my direct supervisor when environmental problems arise.	5.69	1.02	66.67	3.7	7.41	66.67
My direct supervisor is willing to assist me in solving environmental problems.	5.41	1.13	55.56	4.94	9.88	55.56

An important factor that encourages supply chain employees to engage in environmental behaviors is supervisory support. We present our findings on this factor in Table 12. On average, many of the supply chain employees rated their supervisors as exhibiting commitment to environmental activities. The average response on a scale from 1 to 7 (1=Strongly Disagree; 7=Strongly Agree) is a rating of 5. Therefore, these results speak to the importance of having a supervisor on-board to environmental matters.

Table 12: Perception of Environmental Commitment Among Senior Managers

Item	Mean	Std. Dev.	% 5 or higher	Disagree (1 to 3)	Neutral - 4	Agree (5 to 7)
My direct supervisor talks up environmental projects and activities.	4.88	1.31	33.33	16.05	18.52	33.33
My direct supervisor is open to implementing environmental initiatives.	5.59	0.96	60.49	2.47	11.11	60.49
My direct supervisor believes that more practices that support the environment would be beneficial to our facility.	5.09	1.15	39.51	6.17	28.4	39.51

We now turn to describing the level of supply chain employee engagement in environmental behaviors. We examine supply chain employee engagement in environmental behaviors in two different ways. In Table 13, we examine environmental behavior in terms of percent of time spend on environmental activities. As shown below, most of our sample (60 percent) spent a minimal amount of time on environmental activities. However, as shown in Table 14, many employees were involved in specific environmental projects (e.g., recycling and reusing materials).

Table 13: Percent of Time Spent on Environmental Behavior

					Minimal Engagement	Partial Engagement	Moderate Engagement	Above Average Engagement	Substantial Engagement	Full Engagement
Item	Mean	Std. Dev.	% > 0	mean > 0%	0 to 5%	5 to 25 %	25 to 50 %	50 to 75%	75 to 99%	100%
During the past 12 months...										
What percent of your work time was spent preventing environmental problems from occurring?	8.45	8.92	85.53	9.88	57.89%	40.79%	1.32%	0%	0%	0%
What percent of your work time was spent on new environmentally-friendly projects?	6.63	8.87	77.63	8.54	72.37%	23.68%	3.95%	0%	0%	0%
What percent of your work time was spent on on-going environmentally-friendly projects?	7.72	9.09	82.89	9.32	63.17%	34.21%	2.64%	0%	0%	0%

Table 14: Involvement in Environmental Behavior Over the Past 12 Months

Item	Mean	Std. Dev.	% Sometimes or Above	Never to a Moderate Level (1 to 4)	Sometime to Substantial Level (5 to 8)	Frequently (9)
I recycle material as a normal part of my job (e.g., plastic bottles, etc)	7.24	2.28	88.46%	11.54%	46.15%	42.31%
I look for opportunities to reuse physical materials (e.g., salvage materials from returned products).	6.8	1.85	89.74%	10.26%	70.51%	19.23%
I look for opportunities to use environmentally responsible packaging for the company's products.	5.5%	2.24	74.35%	25.64%	65.38%	8.97%
I champion energy conservation efforts in my department.	5.70%	2.19	77.93%	22.08%	66.24%	11.69%

Summary and Conclusion

We will now turn to summarizing our key findings and providing a list of recommendations.

Recommendation #1:

The majority of firms in our sample face pressure from suppliers and customers to engage in sustainability practices. This finding is consistent with evidence from organizations such as Wal-Mart, Pricewaterhouse Coopers, National Association of Environmental Managers, among many others that manufacturers are under pressure to adopt improved corporate environmental management reporting practices and employee behaviors to respond to these pressures.

We recommend that the firms in our sample work with their key suppliers and customers to learn about ways that they can report on how the organization is acting in corporate socially responsible ways. The production of a corporate social responsible report is one method that can be used to document and report on the firm's social responsibility efforts and achievements. Also, firms should consider working with third parties on attaining ISO 14000 status as well as seeking out assistance from CIRAS.

Recommendation #2:

Many of our firms do not believe that an environmental management/revenue trade-off exists. Stated differently, pursuit of environmental goals does not require that a firm needs to sacrifice on its revenue goals. Indeed, the achievement of the triple-bottom line involves a balance of profit, planet, and people goals and an environmental management strategy is consistent with this concept.

We recommend that Iowa-based firms continue to pursue environmental management activities for many reasons. One important reason is that when a firm engages in environmental management programs it can lead to cost savings because re-work efforts are minimized.

Recommendation #3:

We discovered that many of the firms in our sample are engaged in environmental management activities (see Table 5). Local sourcing appears to be an area where many Iowa companies are allocating resources.

Clearly, there are additional areas where Iowa firms can improve their environmental performance. We recommend that firms conduct environmental audits as a way to improve their environmental performance in existing operational areas. Firms should also receive feedback from suppliers and customers for future environmental performance improvement opportunities.

Recommendation #4:

Surprisingly, we found that the senior managers in our sample are not heavily involved in environmental management activities. These managers do not spend the majority of their work time on environmental efforts. A plausible explanation is that environmental duties are delegated to lower levels of the organization.

We believe that it is important for senior managers to improve their own environmental behavior. Senior manager environmental behavior can send an important signal to lower level employees that acting in environmentally responsible ways is valued at the manager's company.

Recommendation #5:

The majority of the supply chain lower-level employees in our sample reported that they are under pressure to engage in environmental behaviors. This finding is consistent with finding #4 that environmental responsible behavior is pushed-down in the organization.

To the extent that environmental behavior is valued, we recommend that upper management communicate this expectation in various forms of company documentation. Firms should also consider implementing environmental training programs, green teams, and reward/recognition programs to further encourage environmental behavior.

Recommendation #6:

Similar to the findings in the senior manager survey, we found that lower-level employees do not spend the majority of their time on environmental management activities. However, we did find that supply chain employees do recycle materials as a normal part of their job and look for opportunities to salvage materials that would normally end-up in the landfill among many other environmentally responsible behaviors.

Because supply chain employees are not heavily engaged in environmental behaviors, we believe that top management should increase their value of this activity. Top management should communicate this expectation to the employee's supervisors. Further, this behavior should be monitored and tracked for regular evaluation and feedback purposes.

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