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Sustainable Purchasing Practices: An investigation into current industry awareness and practice

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February 6-8, 2013
Phoenix, Arizona

CIEEC



Engineering
Education in an
Era of Globalization

The Conference for Industry
and Education Collaboration



2013 Conference for Industry and Education Collaboration (CIEC)

Technical Sessions

February 6-8, 2013
Phoenix, Arizona
Engineering Technology Division (ETD)

Wednesday, February 6

1. ETD 325 — Curriculum Innovation Driven by Industry Input, 2:00 pm - 3:30 pm Fairway 1

Moderators:

Walter W. Buchanan, Ph.D., J.D., P.E. & Dr. Angie Price

Presenters:

Niaz Latif, Mohammad Zahraee, Saeed Foroudastan, Ravi Shankar, Borko Furht, Jaime Borrás, Robert J. Durkin, Jaime Borrás, Ravi Shankar, Fran McAfee, Michael Harris, Don Ploger, Oren Masory, and Ravi Behara.

Examples are covered here of curriculum innovation driven by industry input. At Purdue University - Calumet an industry and education partnership is taking place providing research experience for students through industry projects. At the Florida Advanced Technological Education Center of Excellence integrating industry validated credentials into engineering technology degrees is happening. At Middle Tennessee State University an engineering management degree forms an innovative partnership with industry. At Florida Atlantic University the Mobile Technology Consortium (MTC) has formed through an Industry- University Alliance as well as using Motorola's vision to impact its engineering curriculum. IUPUI is forging an industrial partnership with engineering technology capstone courses. And at Daytona State College its Prism Project is fostering green energy industry training.

Presentations:

1. Industry and Education Partnership- Research Experience of Students through Industry Projects

Niaz Latif and Mohammad Zahraee
Purdue University - Calumet
(Presentation only)

2. Engineering Management Degree Forms - Innovative Partnership with Industry

Saeed Foroudastan

Middle Tennessee State University

3. Mobile Technology Consortium (MTC): An Industry-University Alliance

Jaime Borrás, Wireless Silicon Group Inc.

Ravi Shankar and Borko Furht, Florida Atlantic University

4. Forging the Industrial Partnership with Engineering Technology Capstone Courses

Robert J. Durkin

IUPUI

5. Impact of Motorola's Vision on Florida Atlantic University's Engineering Curriculum

Jaime Borrás, Wireless Silicon Group

Ravi Shankar, Fran McAfee, Michael Harris, Don Ploger, Oren Masory, and Ravi Behara
Florida Atlantic University

6. Curriculum Development Driven by Industry Input

William Leonard

Rochester Institute of Technology

2. ETD 335 — Program Development I, 4:00 pm - 5:30 pm Fairway 1

Moderator:

Terri Schulz

Presenters:

Christy Bozic, Chad Laux, Diana Sanchez-Ramirez, Daphene Koch, Kathryne A. Newton.

Presentations:

1. **Made for Indiana – Engineering Technology Success across the State – Lessons Learned**, Christy Bozic, Duane D. Dunlap, Purdue University, West Lafayette

2. **Curriculum Innovation Driven by Industry Inputs: Engineering Technology Pathways**, Chad Laux PhD, Diana Sanchez, Purdue University, West Lafayette, Indiana

3. **Collaborating With Industry Manufacturers To Train Managers**, Daphene Koch, Purdue University, Brad Tycholiz Victaulic, Easton, PA

4. **Sustainable purchasing practices: An investigation into current industry awareness and practice**, Frank Palisi, Kathryn Newton, and Edward Sweeney, Purdue University

Thursday, February 7

3. ETD 425 — The Deans' Forum , 9:00 am - 10:30 am Fairway 1

Moderators:

Walter W. Buchanan, Ph.D., J.D., P.E. & Dr. Angie Price

Presentations:

The ET National Forum is asking industry what it wants from our graduates. Another important driving force is the pressure being applied to deans by their universities. This panel of three deans will discuss these forces and their vision for what success will look like in five years.

4. ETD 435 — Internships, Capstone Projects, Engineering Centers, and Other Methods to Work with Industry, 11:00 am - 12:30 pm Fairway 1

Moderator:

Daphene Koch

Presenters:

Walter W. Buchanan, Texas A&M University, Jose Galvan, Eden Fisher, Elizabeth Casman, Mitch Small, Ricky Orr, Sejun, Song, Kim Deranek, Edie Schmidt, William Leonard, Barbara Mac-Queen, Donald Ploger

Presentations:

1. **Assessing the Impact of Mandatory Internships on Employability of Recent College Graduates in Mexico**

Jose Galvan, Eden Fisher, Elizabeth Casman, and Mitch Small
Carnegie Mellon University

2. **Changing Capstone Projects at Weber State University**

Ricky Orr

Weber State University

3. Fostering Telecommunication Engineering Students via Cisco Test Engineering Center

Sejun Song

Texas A&M University

4. Making It Real: Immersing Students in Week Long Enterprise Resource Planning Simulations

Kim Deranek and Edie Schmidt

Purdue University – West Lafayette

5. Mission Impossible – Maximum Learning in Minimum Time

Barbara MacQueen

Vancouver Island University

6. Engineers and Other People: Communicating Engineering Results to a Larger Audience

Donald Ploger

Florida Atlantic University

5. ETD 445 – Program Development II, 2:00 pm - 3:30 pm Fairway 1

Moderator:

Daphene Koch

Presenters:

Scott L. Springer, Edie Schmidt, Brent A Payne, Shweta Chopra, and Chad Laux

This session is centered on the topic new program development as well as enhancing existing programs. This session also focuses on innovative techniques and activities that have been introduced in the classroom. These innovations range from usage of new tools, a different way of using existing tools, applying active learning and other pedagogy.

Presentations

- 1. Experimental Evaluation of Alternative Fuels for Internal Combustion Engines**, Scott L. Springer, University of Wisconsin Stout
- 2. Making It Real: Immersing Students In Week Long Enterprise Resource Planning Simulations**, Kim Deranek, Edie Schmidt, Purdue University, West Lafayette

3. **Idiomatic Programming: A Pedagogical Tool for All CS1 Courses**, Richard Meyers, New York Institute of Technology
4. **The Engineering Clinic at the University of Arizona: An Integrated Approach to Engineering Education and Industry/Academia Partnership**: Ara Arabyan, Professor of Mechanical Engineering and Director of the Engineering Clinic, University of Arizona.

February 6-8, 2013

6. **ETD 455 — Professional Aspects of Education, 4:00 pm - 5:30 pm** **Fairway 1**

Moderator:

Kenneth L. Burbank

Presenters:

Joseph Cecere, Rebeca G. Book, Marilyn Dyrud, Daphene Koch

This session includes presentations that apply professional aspects of a discipline to the classroom. The topics include industry-academia collaboration Professional Aspects of Education

Presentations:

1. **Partnering with Industry and Higher Education on BIM**, Sofia M. Vidalis, Joseph Cecere, Penn State Harrisburg
2. **Bridges Between Industry & Academia & Their Impact on Assessment, Curriculum, and Funding**, Rebeca G. Book, Pittsburg State University
3. **Connecting K-12 Teachers to STEM Careers through Industry Collaboration**, Daphene Koch, Mary E, Johnson, & Brandeis H Marshall, Purdue University, West Lafayette

Friday, February 8

7. ETD 525 — Writing for Professional Publications, 8:00 am - 9:15 am Fairway 1

Moderators:

Walter W. Buchanan, Ph.D., J.D., P.E. & Dr. Angie Price

Presenter:

Marilyn Dyrud

This session is designed to give writers a complete picture of the journal publication process. The panel members all represent the Journal of Engineering Technology (JET), but the process and requirements are applicable to most professional journals. Presenters include current and past editors-in-chief, the manuscript editor, the production editor, and the communications editor. Each will address his or her particular area of responsibility. Attendees will leave the session with a full understanding of the publication process, from submission through publication, and techniques to improve their manuscripts to increase their acceptance rates.



Sustainable purchasing practices: An investigation into current industry awareness and practice

Frank Palisi, Kathryn Newton, and Edward Sweeney

Abstract

This research study illustrates the importance of sustainable purchasing practices for organizations in the U.S. distribution industry and answers several important questions: what is the current awareness of U.S. organizations regarding sustainable purchasing practices; to what extent are U.S. organizations evaluating, selecting, and retaining suppliers based upon sustainable purchasing practices; and to what extent are sustainable purchasing practices being implemented by the U.S. organizations under study? With an ever increasing global economy, is it critically important for organizations to put in place sustainability practices; the biggest impact organizations can make is often in an organization's purchasing department. The researcher begins by explaining the reasoning for conducting the research, and then builds the readers' understanding of sustainability in a supply chain environment. It then moves to the subject of how sustainable purchasing can be an advantageous method for bringing about "triple bottom line" savings to an organization. This section is followed by the researcher's methodology and ending results for a survey conducted to examine the current awareness and implementation of sustainable purchasing practices among U.S. plumbing, heating, cooling and piping (PHCP) distribution firms who participated in the study.

As organizations become more global and interact with organizations in different communities and corresponding governments around the world, one result is an increased chance of supply disruptions and potential brand image damage. Organizations need to focus on training their employees on sustainable purchasing practices (SPP) to ensure protection from external threats and supply disruptions. Countless organizations made the mistake of purchasing materials or products from unethical suppliers and had to deal with the resulting negative consequences. These consequences come in many forms but all affect the organization's triple bottom line. To protect an organization from financial fines and losses in market share an organization should focus on supply chain transparency between upstream and downstream members. Sustainability may be thought of as protecting one's organization from any threat that may disrupt normal business activities. By looking ahead an organization may better protect their product from being eliminated due to scarcity of resources or increased legislative regulations.¹ To truly be sustainable an organization must eradicate risks to their business. An organization is only able to do this by adhering to practices supporting the three pillars that constitute sustainability: environmental, social, and economic responsibility. These three pillars are also described as an organization's triple bottom line performance.²

Since 1950 the world's population has more than doubled, energy production has tripled, and economic output has increased by a factor of five.³ Products in developed countries are continuously being produced without care for manufacturing and product inefficiencies, thus creating more pollution than necessary. This is done to meet an ever-consuming societal demand. Countries and organizations must turn towards the concepts of sustainability or they risk seeing their natural resources disappear.⁴

This study focused on the procurement function of the supply chain and the various forces a buyer may use to implement SPP. The purchasing department is often the first point of contact between external and internal suppliers. These personnel are in charge of what is allowed into the product and facility. Relationships and trust are formed between the buying and selling organizations through the buyer role, and it is the maintenance of these relationships and strategic partnerships that have a large impact on long term sustainability and innovation in purchasing practices. The buyer-supplier relationship is of great importance to help nurture and implement sustainable strategies throughout an entire supply chain (SC).⁵

Though today a buyer can affect the sustainability of the SC, this has not always been the case. In the 1950s the buying organization looked mainly upon the price of a product when choosing a supplier. Now in the 2000's a buyer must take a holistic view; with increased public scrutiny from around the globe it is now important for a buyer to factor in countless variables when selecting a supplier.⁶ This holistic view is a critical part of sustainability.^{7,8} An organization cannot limit their view to solely their immediate suppliers. An organization must look as far upstream the SC as possible and also consider how their products are being used and disposed of downstream to safeguard ethical and legal boundaries.⁹ When selecting a supplier it is important to be cautious of suppliers that only meet the minimum qualifications of current legislation, rather than taking the larger, more holistic view of sustainability. It is important to be proactive and try to predict the damage a process or product may cause, and try to reduce it to forgo future legislation.¹⁰

The purchasing personnel in the majority of organizations throughout the United States are already using sustainable practices in one way or another by participating in cross-functional teams that save millions of dollars by reducing waste. Some sustainable practices have been in implementation for decades such as lean production/manufacturing,¹¹ life cycle analysis (LCA), and product life extension (remanufacturing).¹² Organizations' product development programs are now becoming more involved with their suppliers and the boundaries of organizations are beginning to blur.

Organizations are realizing benefits of SPP by incorporating suppliers into the initial steps of product development. Suppliers are sources of ideas, technology, time savings, energy, materials, and money; often acting as external consultants. However, more training is needed with small and medium enterprises (SMEs) for both the supplier and buyer organizations to fully achieve sustainability.^{13,14,15} The study examined the notion that resource restrictions were often the reason that SMEs were unwilling or unable to participate in training their purchasing departments on SPP. The need for larger organizations to aid their SME suppliers in the effort to educate the purchasing department is evident when one stops to consider the potential positive outcomes of such actions. A ripple effect could occur if large buying organizations used their market power to transform their supply base into more efficient and sustainable suppliers. Other buying organizations from the same suppliers would have the benefit of more efficient products and/or processes in place. The overall end result could be reduced prices in the marketplace and a potential competitive advantage for all organizations in the vertical channels impacted.

Organizations must rely heavily on their individual employees' ethics to maintain a standard of social responsibility. A continual threat to ethical sustainability is the intrinsic opportunistic behavior inside every individual to be better than their competition. This can lead to dealings with suppliers who are not fully transparent in how they have approved product purchases or have cut a few corners to make up for increasing overhead costs. Such behavior can lead to costly unneeded monitoring from an outside source (i.e. government officials, third party consultants). By creating an ethical culture, an organization creates an advantage against their competitors because the cost for the personnel, the work hours, and the supplies that go into monitoring systems would be superfluous.¹⁶

Survey Research

This study was conducted using a structured web-based survey created from pertinent literature. It was emailed to the American Supply Association member database including manufacturers and distributors.. Data for this research was collected via a web-based structured survey. Data was easily analyzed from the online surveys due to the use of Purdue Qualtrics which aided in statistical and graphical interpretations of the data. The use of an online survey also aided with the elimination of error from transcribing the data and thereby also contributed to the validity of the results. The utilization of closed-questioning was for simplifying the analysis of the data and also to reduce the amount of time it took for the survey to be completed. The population was sent an email with a short description of the researcher and what the researcher hoped to accomplish through the survey. This was done to bring a humanistic connection between the participant and the study. The survey was made up of 25 possible questions and took between 5-10 minutes to complete. The survey was split up into three different sections: demographic (Q1-10), training on sustainable purchasing (Q11-15), and implementation of sustainable

purchasing (Q16-25), respectively. Only one section at a time was presented to the participants. Survey items were developed from previously validated work.⁵ A pilot survey was conducted with subject matter experts prior to the survey administration to increase its validity.

The study's participants were asked about the relationship between them and their suppliers to find out if there was a solid foundation of trust between the two parties. A low 7.69% of the population said the promises made by their suppliers were considered unreliable. This solid foundation of trust is what creates a strong relationship that allows for a more supportive SC which leads to new innovations and cost savings. This strong relationship was demonstrated in the results as 61.53% of the respondents stated they solved supplier problems jointly.

When it comes to SC monitoring, 69% of the population did not conduct environmental audits of their suppliers which meant at least one pillar of sustainability is not typically fulfilled. For the remaining population who replied, 28% responded the environmental audit for foreign suppliers was more lenient than for domestic suppliers. This is not a major concern in a way for small and medium (SME) buying organizations because there is not a large publicized focus on SMEs as there is for large organizations. SMEs are currently more able to tread softly below suspicion from any external organization or stakeholder. Also, an organization cannot expect to monitor their supplier's environmental awareness and benchmarking when the buying organization does not actively participate in such activities; it was found that 97% of the population did not participate in environmental auditing of their own organization. This problem is again very common when it comes to SMEs with relatively limited human resources and lack of competency in SPP. While the majority of the population responded their domestic suppliers' evaluations were more informal than formal at 65.38% to 23.08%, respectively, this again reconfirmed that with SMEs it is difficult to monitor and evaluate foreign suppliers.

Recently, there is an increasing trend for organizations to form strategic partnerships with non-governmental organizations (NGOs). These relationships can be mutually beneficial. While the NGO is able to have their point heard by large organizations and help spur change, the large organizations are able to view the main concerns of the local community and do not have to invest the use of their own resources to survey or even combat a local disturbance.

There are several obstacles to overcome when thinking about the implementation of SPP:

- High cost of environmental programs
- Uneconomical recycling

- Uneconomical reusing
- Lack of management commitment
- Lack of buyer awareness
- Lack of supplier awareness
- Lack of company-wide environmental standards or auditing programs
- Loose state environmental regulation
- Loose federal environmental regulation¹⁷

Many of these obstacles can be overcome by educating the purchasing department which will create the trickle-down effect of knowledge from buyer to supplier. Once the buyers are educated, the suppliers typically follow due to the implementation of new purchasing practices..

As though implementing sustainable purchasing practices (SPP) through a domestic supply chain was not difficult enough when all parties have the same government regulations and NGO pressures. The implementation of sustainability practices with foreign suppliers becomes even more difficult due to the reduction of communal stakeholders and government mandated regulations to adhere to. The foreign supplier may have lax regulations or no pressure from a NGO to change their working conditions, which was found to be the case in this study. This all ties back to the buying organization having more clout and being able to show top management the usefulness of sustainability practices.¹⁸ Many organizations fail at gaining top management support for SPP. Of the majority of SMEs in this study, many did not include sustainability goals in their corporate goals. This shows the lack of knowledge that top management has regarding the subject of sustainability and the positive influence it could have on their business decisions. However, this knowledge was present in those surveyed, 17% of the population responded as having a good understanding of SPP, while the remaining population declared of having very bad to zero understanding of SPP. Further validating this lack of understanding, survey results demonstrated that many believed that training on SPP would not be beneficial and would not impact their buying decisions. Better training techniques need to be developed with a low cost mind frame so training can be provided to SMEs such as those participating in this study. It was obvious that the study participants lacked awareness of the possible benefits that could be achieved from SPP training.

To verify the extent that participants were not aware of SPP, the study asked how they perceived their organizations participated in different activities. Fourteen different practices considered standard in SPP were listed to see if by chance the respondents were actively participating, but did not comprehend that the practices were SPP. Out of the 14 different practices only four activities stood out from the pack as being actively

participated in: volunteering at local charities; donating to philanthropic organizations; ensuring safe, incoming movement of product to their facility; and reducing packaging material. These activities are considered within an organization's control and are relatively straightforward processes to change. A respectable 46% of the respondents did understand that a change in the way products were being packaged and shipped as a way to be more environmentally sound and reduce the amount of virgin material used.

However, the vast majority still had the mindset from the 1970's that purchasing decisions should be made strictly based on the price and quality. The majority of the population had not broadened their concerns to the life cycle of their products nor any of the potential external impacts of their products as they move through their supply chains (SC). Every organization is different with different business factors that must be satisfied and their own route to managing their SC. Many do not have the resources to take advantage of the many opportunities afforded to them with a sustainable mind set. The more time a buyer interacts with a supplier, the more sustainability practices and cost savings can be achieved. Resource constraints play a role in the available time an individual has to participate in training or educating suppliers along with driving innovations into their daily operations.

One of the last questions related to the evaluation of SPP implementation when selecting suppliers. The respondents were asked to grade a list of six factors regarding how important they were in selecting a supplier. The top two factors were price and quality, which as stated earlier, have long been the traditional criteria for purchasing organizations. This is because these factors are easily evaluated and have been the focus in purchasing as cost saving and quality measures. But an organization with a sustainable mind set would have also ranked environmental impact and business practices as number two or three importance. This population ranked the business practices and environmental impact of suppliers as their lowest concerns. These two factors would require them to have further in-depth knowledge of their suppliers, and would require an evaluation audit of each supplier to be undertaken before a job was awarded to a particular supplier. Supplier location was ranked as a medium concern with this population which can be due to just-in-time modeling and lead-time concerns, rather of environmental or social impacts created by using local suppliers.

Recommendations

Organizations need to invest in training their employees on how to bring sustainability into their daily decision-making. This all starts with upper management placing sustainability issues into their organization. Without support from top management to change the mindset of the organization, the purchasing department will never become aware of how big of an impact it can make on the bottom line. Along with asking

suppliers to make changes along the sustainability horizon, the buying organization must be the first to show investment by investing internally. It is this researcher's recommendation these organizations begin with several actions that could be considered "low hanging fruit" including: reduction of packaging; incorporation of sustainability in their organization's objectives; and the establishment of goals for reducing hazardous waste from their facility and reducing the use of virgin material. As an organization begins the process of moving to a more sustainable horizon, the organization needs to continue to improve and use guidelines such as ISO 140001 and the Global Reporting Initiative (GRI) to aid their development. The next recommendation is for these organizations to benchmark themselves against best practices both internally and externally for improvement year after year. A privately owned organization without the pressures of the government or shareholders has no reason to change or report unless it comes from top management. Organizations need to invest in monitoring their suppliers both foreign and domestic, but more importantly need to monitor themselves to protect their own facilities from regulative fines, and to be prepared for further state and national legislation. As an industry it would be in their self-interests to use ASA as a common discussion point to develop supplier evaluation and monitoring techniques to be shared and implemented industry wide. This would help negate further creation of costly legislation and help improve the opportunity for cost savings. The last recommendation to organizations is to begin and progress with small changes to policy. When small changes are made they are easily attainable and more importantly, sustainable.

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