To,..........................................................................................

15th August, 2008

Sub: Development of Performance Measures for Environmentally Conscious Manufacturing

Dear Sir/Madam,

I am Perminder Jit Singh working as an Assistant Professor at Punjab Engineering College, Chandigarh and pursuing my doctoral thesis on the topic of environmentally conscious manufacturing (ECM). It gives me immense pleasure to interact with you on this topic.

With growing awareness of environmental issues – from global warming to local waste disposal – business and government have come under increasing pressure to reduce the environmental impacts involved in the production and consumption of goods and services. Lack of appropriate performance measures, derived from corporate strategies and capabilities, has been cited by many practitioners as a barrier to the implementation of ECM.

I am developing a framework of performance measures for ECM as a part of my Ph.D. thesis. After an exhaustive survey of diverse literature, I have found 108 variables classified under 12 performance measures. But, most of the research papers I found are related to empirical study of various markets notably – Europe, USA, Japan, New Zealand, Taiwan and China and none to the Indian industry. The primary purpose of this research is to develop the ECM performance measures for Indian industry to make it internationally competitive.

In this context, I request you to kindly fill the attached questionnaire, which is one of the important components of my research work. Your judicious response will assure substantial judgement in this exercise and help to carry out the same successfully. I will be happy to acknowledge the same. Please make it convenient to spare your valuable time to fill in and return the attached questionnaire.

The collected information will be kept confidential and utilized for research purpose only. If you wish not to, you may not disclose your or your company’s identity. I welcome your suggestions. Should you require any additional information, please do not hesitate to contact me.

If you are not associated with this subject then forwarding this letter to the concerned person will be of a great help.

Thanking you.

Yours truly,

Perminder Jit Singh
Address for Correspondence:
Sh. Perminder Jit Singh
House No. 209, Punjab Engineering College Campus
Sector 12, CHANDIGARH – 160012
E-mail: perjay2000@yahoo.com; Alternate permindersingh@pec.ac.in
Ph. 0172-2743960 (R); 09988688691 (M)
PART I: GENERAL INFORMATION OF PARTICIPATING ORGANIZATION AND RESPONDING PERSON

Name of the organization: .................................................................
Address ............................................................................................................................
............................................................................................................................
Type of the organization: ....................................................................................................
Primary products of the organization: .................................................................
No. of employees: .........................................................................................................
Sales turnover: ..............................................................................................................
Exports (Percentage of sales turnover): .................................................................
Primary export market: USA/EUROPE/GULF/EAST ASIA/AFRICA/Any other

Name of responding person: .................................................................
Designation: ......................................................................................................................
Department: ....................................................................................................................
Experience (years): ........................................................................................................
e-mail: .............................................................................................................................
Ph. No. ...............................................................................................................................

Would you like to be contacted over phone for any further information? YES/NO
Can I acknowledge you in my research work/thesis? YES/NO
Can I acknowledge your organization in my research work/thesis? YES/NO
• Does your organization has ISO 14000 series or any other environmental management system/certification? If yes, please name it.

• Does any of the products produced by your organization has any eco-label? If yes, please name it.

• Does a similar product produced by any organization carry any eco-label? If yes, please name the label.

• Does your organization have any environmental performance measurement system? If yes, please write important measures and variables (indicators) in space below.
PART II: ECM PERFORMANCE MEASURES AND RELATED VARIABLES

Please rate the degree or extent of practice for each variable on 1 to 5 scale where:

(1 – Very Low, 2 – Low, 3 – Medium, 4 – High, 5 – Very High)

OR

(1 – Completely Disagree, 2 – Rarely Agree, 3 – Partly agree, 4 – Rather Agree, 5 – Completely Agree)

A typical example is shown below:

<table>
<thead>
<tr>
<th>Organization has an explicit environment policy/vision</th>
<th>Completely Disagree</th>
<th>Rarely Agree</th>
<th>Partly agree</th>
<th>Rather Agree</th>
<th>Completely Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Top Management Commitment</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Top management commitment for ECM is visible to all employees</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii) Organization has an explicit environment policy/vision</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii) Environmental issues are addressed as business issues</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv) Written strategy to guide organization to achieve environmental vision of the organization</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v) Top management monitors the progress in ECM</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi) Regular financial resources are allocated for ECM development</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii) Periodic environmental audits are done</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Middle Management Commitment

| Middle management is involved in environmental policy development | 1 2 3 4 5 |
| i) Middle management is involved in environmental policy development | 1 2 3 4 5 |
| ii) Environmental goals/targets to be achieved clearly conveyed to the middle management | 1 2 3 4 5 |
| iii) There is a documented ECM implementation methodology | 1 2 3 4 5 |
| iv) ECM implementation improves productivity | 1 2 3 4 5 |
| v) ECM implementation improves quality | 1 2 3 4 5 |
| vi) Environmental awareness/training/competence programs conducted for middle management | 1 2 3 4 5 |

3 Employee Involvement

| There are teams to tackle environmental issues | 1 2 3 4 5 |
| i) There are teams to tackle environmental issues | 1 2 3 4 5 |
| ii) Employees are empowered to handle environmental problems | 1 2 3 4 5 |
| iii) Employees are actively involved in process of determining environmental goals/targets | 1 2 3 4 5 |
| iv) Employees are encouraged to give suggestions on environmental performance improvement | 1 2 3 4 5 |
| v) Employees are recognized for their contribution to environmental performance improvement | 1 2 3 4 5 |
| vi) Organization has a framework for evaluating quality of employee participation in ECM | 1 2 3 4 5 |

4 Employee Training

| ECM needs are properly identified | 1 2 3 4 5 |
| i) ECM needs are properly identified | 1 2 3 4 5 |
| ii) Environmental awareness programmes are conducted routinely | 1 2 3 4 5 |
| iii) Environmental training programmes are conducted routinely | 1 2 3 4 5 |
| iv) Environmental competence programmes are conducted routinely | 1 2 3 4 5 |
v) Percentage trained workforce on environmental issues
vi) Expenditure on environmental training
vii) Availability of literature on environmental issues
viii) Continuous update of environmental literature
ix) Documentation of environmental lessons learned from previous products/technology, etc.
x) Review of environmental training/retraining needs is done periodically

5 Human and Technological Resources
i) Organization has a separate environmental department
ii) Organization has enough internal environmental experts
iii) Organization has the required knowledge for ECM
iv) Organization employs external environmental experts
v) Environmentally benign/clean technology is used
vi) Energy efficient technologies are used
vii) Environmental experts are involved during technology development/procurement
viii) Environmental experts are consulted before using new technology

6 Product Design/Product Characteristics
i) Possibility of use of recycled material considered in design of products
ii) Possibility of reducing regulated material considered
iii) Use of non-toxic/non-polluting material considered
iv) Use of low energy consuming manufacturing process evaluated in design of products
v) Low energy consumption during operation/use considered
vi) Low energy consumption during maintenance/service considered
vii) Reducing toxic/hazardous waste (solid/liquid/gaseous) during manufacturing/operation/service/disposal considered
viii) Possibility of using used parts considered
ix) Possibility of using remanufactured parts considered
x) Possibility of recycling considered
xi) Increasing product durability is evaluated
xii) Ease of disassembly considered
xiii) Product disposal in environment friendly manner considered
xiv) Possibility of eliminating secondary processes (polishing/painting/buffing, etc.) considered
xv) Value engineering/analysis is used in design of products

7 Process Design/Process Characteristics
i) Environmental issues considered in the selection of processes for producing products
ii) Reducing the natural resources during manufacturing is considered
iii) Use of renewable resources considered in manufacturing process
iv) Environmental issues are considered in the process of production planning and control

8 Logistics Design
i) Reducing the use of packaging considered
ii) Packaging material recollection planned
iii) Packaging material disposal planned
iv) Possibility of use of recycled material for packaging material considered
v) Possibility and ease of consumer/end user accessibility to the recycling centre considered
vi) Collection and distribution of products/parts that will be recycled, remanufactured or reused considered
vii) Reverse logistics considered in stock planning
viii) Environmental issues considered in the design of logistics management

9 Vendor Management
i) Environmental performance is one of the criteria in vendor selection
ii) Environmental expectations communicated to vendors in writing
iii) Vendors are involved in environmental awareness/training/competency programmes
iv) Environmental audits/certification of vendors considered
v) Participation of vendors in information sharing on environmental issues

10 Costs
i) Consideration of environmental issues reduces waste handling cost
ii) Consideration of environmental issues reduces waste categorization cost
iii) Consideration of environmental issues reduces waste treatment cost
iv) Consideration of environmental issues reduces waste disposal cost
v) Consideration of environmental issues reduces waste storage cost
vi) Consideration of environmental issues reduces product transportation cost
vii) Consideration of environmental issues reduces packaging cost
viii) Consideration of environmental issues reduces overall cost of the product
ix) Consideration of environmental issues reduces cost of production
x) Consideration of environmental issues reduces user operation/use cost
xi) Consideration of environmental issues reduces maintenance/service cost
xii) Consideration of environmental issues reduces transportation cost
xiii) Consideration of environmental issues reduces overall cost of the organization

11 Benefits
i) Consideration of environmental issues improves customer loyalty/satisfaction
ii) Consideration of environmental issues improves product performance
iii) Consideration of environmental issues improves organization profit
iv) Consideration of environmental issues improves sales turnover
v) Consideration of environmental issues improves organization image in public
vi) Consideration of environmental issues improves staff morale
vii) Consideration of environmental issues improves organization working conditions
viii) Consideration of environmental issues reduces waste generation
ix) Consideration of environmental issues reduces regulatory concerns
x) Consideration of environmental issues reduces liabilities
xi) Consideration of environmental issues enhances market opportunity
xii) Consideration of environmental issues helps in establishing/improving brand value