LEAN AND GREEN: TOWARDS GREEN HRM USING SIX SIGMA

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Abstract
Making the HRM function greener by reducing wastage and cutting down the usage of material that are not environment friendly is a big challenge. To be sustainable, businesses are now embracing a relatively new objective: optimizing their operations to improve environmental and social outcomes in a manner that increases overall performance. The Six Sigma technique is a tool that can be used to approach this challenge methodically, in order to achieve the objective. Global technology giant IBM has done remarkable work in this direction and has developed GreenSigma. It is an adaption of Lean Six Sigma to environmental and climate protection, which offers a range of solutions in this direction.

Keywords: Green HRM, Six Sigma, Eco-friendly material, Lean Manufacturing, Environment, GreenSigma,

Introduction
Universal awareness of global warming and its fatal effects on the future of our universe has led to a lot of initiatives from the ever industrializing world. The concern about the environment made every industry to think in the direction of sustainability of their processes. It is now widely accepted that, the children and grand children of the present population - already born or yet to be born – have the same right on this mother earth as we have. This gave rise to a host of eco friendly measures being practiced in the organizations and triggered many more innovations and ideas in this direction.

Role of HR
The first question raised in this was about the role of HR. Like in other functions, here too, HR plays a supporting role in the implementation of eco friendly measures of other departments or the HR by itself involve in green initiatives? The HR has played both roles. Shaki (2012) puts it as ‘HR professionals in organization can develop a powerful social conscience and green sense of responsibility internal and external customers, stakeholders, partners etc’. The HR can drive the organization’s environmental initiatives to reduce employee carbon footprints. Logica media centre thought pieces (2011) lists under ‘Green HR’ the initiatives ‘The likes of electronic filing, car-sharing, job-sharing, teleconferencing and virtual interviews, recycling, telecommuting, online training, and energy-efficient office spaces. These ideas are being implemented more often with each passing year, and dovetail with existing green HR efforts focused on increased process efficiency, environmental waste reduction, and revamped HR products, tools, and procedures’.

Role of Six Sigma
Brue (2002) explains ‘Six Sigma is a problem solving technology that uses your human assets, data, measurements and statistics to identify the vital few factors to decrease waste and defects while increasing customer satisfaction, profit and shareholder value’.

Six Sigma is a business management strategy, originally developed by Motorola, which today enjoys wide-spread application in many sectors of industry. Antony (2008) describes, ‘Six Sigma seeks to identify and remove the causes of defects and errors in manufacturing and business processes. It uses a set of quality management methods, including statistical methods, and creates a special
infrastructure of people within the organization ("Black Belts" etc.) who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified financial targets (cost reduction or profit increase).

GE, an organization which popularized Six Sigma philosophy all over the world, believes that ‘Six Sigma is a highly disciplined process that helps us focus on developing and delivering near-perfect products and services’.

The green initiatives are initiated in any organization in two ways: one by improving existing processes and the second is for developing a new product or service. To address these needs Six Sigma has two key methodologies.

Six Sigma Methodologies

Six Sigma has two key methodologies: DMAIC and DMADV. De Feo et al (2005), explain these methodologies as below.

DMAIC

The basic methodology for DMAIC to improve an existing business process consists of the following five steps:

- **Define** process improvement goals that are consistent with customer demands and the enterprise strategy.
- **Measure** key aspects of the current process and collect relevant data.
- **Analyze** the data to verify cause-and-effect relationships. Determine what the relationships are, and attempt to ensure that all factors have been considered.
- **Improve** or optimize the process based upon data analysis using techniques like Design of Experiments.
- **Control** to ensure that any deviations from target are corrected before they result in defects. Set up pilot runs to establish process capability, move on to production, set up control mechanisms and continuously monitor the process.

DMADV

The basic methodology for DMADV to create new product or process designs consists of the following five steps:

- **Define** design goals that are consistent with customer demands and the enterprise strategy.
- **Measure** and identify CTQs (characteristics that are Critical To Quality), product capabilities, production process capability, and risks.
- **Analyze** to develop and design alternatives, create a high-level design and evaluate design capability to select the best design.
- **Design** details, optimize the design, and plan for design verification. This phase may require simulations.
- **Verify** the design, set up pilot runs, implement the production process and hand it over to the process owners.

DMADV is also known as DFSS, an abbreviation of "Design For Six Sigma".

Key Concepts of Six Sigma

At its core, Six Sigma revolves around a few key concepts. GE website (2012) lists them as below.

- **Critical to Quality**: Attributes most important to the customer
- **Defect**: Failing to deliver what the customer wants
- **Process Capability**: What your process can deliver
- **Variation**: What the customer sees and feels
- **Stable Operations**: Ensuring consistent, predictable processes to improve what the customer sees and feels
- **Design for Six Sigma**: Designing to meet customer needs and process capability

Towards Green HRM

CiteHR (2012) defines Green HRM as ‘an employment model designed to assist industry professionals in retaining, recalling, preserving, and developing talent needed to ensure future business
initiatives and strategies are met. Efficiency afforded by the “Green HR” model can lower operational costs and enables industry professionals to better utilize their investment in knowledge capital.’

Jain (2009) elaborates ‘Green HR is one which involves two essential elements: environmentally friendly HR practices and the preservation of knowledge capital. Green HR involves reducing your carbon footprint via less printing of paper, video conferencing and interviews, etc. Companies are quick to layoff when times are tough, before realizing the future implications of losing that knowledge capital. Green HR initiatives help companies find alternative ways to cut cost without losing their top talent; furloughs, part time work, etc’.

Application Areas for Green HRM
The following are few areas that can be considered for making HRM greener:

Green Printing: Paper and toner wastage due to printing is the one area in HRM that needs attention. This can be avoided by avoiding unnecessary printing, retaining the documents in the soft version, printing unimportant documents on wasted one side printed paper, etc. less printing reduces the less consumption of paper and toner and that in turn reduces the Carbon dioxide (CO₂) emission.

Forms and Covers: Various types of forms and postal covers or envelops are integral parts of any official work. Going digital in case of forms is a measure one can take to reduce the paper consumption. Authentication in the form of individual login can be used. Usage of the covers can be reduced by introducing papers that act as self folding covers (something like our postal inland letters).

Letters and postage of books: Many letters and posts, which intend to give only information, can be replaced simply by emails and with attached documents. Companies send regularly reports like annual reports, etc, to every shareholder, by post. At least 80% of the share holders prefer receiving them through email in soft version for the advantage of sure delivery, browsing the content and preserving. Hence this huge quantity of paper can be saved by preferring the email route to reach the people.

Avoid the use of Plastic and PVC: Plastic, as every one of us is aware nowadays, is posing biggest challenge to environmental safety. Entered the industry as wonderful substitute for all metal products, plastic very soon replaced all materials in manufacturing, because of many of its inherent great properties. Plastic occupied the modern world in such a way that made our lives indispensable without plastic. But due to its environment hazards it is posing due to its non bio degradable property, we need to avoid it in organization as far as possible. Another material that is widely being used is Poly Vinyl Chloride, commonly known as PVC. It is used many places including employee ID cards. It also causes lot of pollution and very hard to recycle. PETG (Poly Ethylene Terephthalate Glycol) is an effective alternative to PVC. Offering all the advantages of PVC, PETG does not produce chloride fumes when burned, giving off only CO₂ and H₂O. Flexible, clear, robust, and light, it is also suitable for contact with food, since no plasticizers or stabilizers are used in its manufacture.

The role of organizations
The organizations those are willing to reduce their employee carbon footprint need not spend a fortune on this endeavor. Sometimes it is by introducing few very simple things, they can get remarkable results. THEGREENITGUY (2010) lists few of them as below.

- Electronic Filing
- Public Transportation
- Bicycle to work
- Ride Sharing
- Job Sharing
- Teleconference
- Telework
- Virtual Interviews
- Recycling
- Energy Efficient Work Spaces
Application of Six Sigma in Green initiatives

Now the question arises about the role that Six Sigma can play and its necessity in making an organization greener. All the above initiatives apart from contributing towards reducing employee carbon footprint save a lot for the organization. Measurability of employee carbon footprint and saving in costs to the organization makes the use of Six Sigma imperative in the implementation of green initiatives of the organization.

Green Sigma initiatives

Green Sigma (2012a) describes ‘Green Sigma or Green Six Sigma is the adaption of Lean Six Sigma to environmental and climate protection. Lean Six Sigma has proven to be a highly efficient method for breakthrough improvements in various industries. Independently from any political consensus, companies, authorities and even private people can utilize GreenSigma to efficiently reduce their own carbon footprint. The joint impact can significantly reduce climate gas emissions’.

GreenSigma is a registered trademark of IBM consulting. It offers to help clients lower their environmental impact, increase efficiency and reduce costs by applying Lean Six Sigma principles to energy and water usage throughout their operations. IBM’s Green Sigma consulting offering is based on Lean Six Sigma, a business strategy for carefully analyzing operations to improve overall efficiency, lower costs, increase quality, and add, change or eliminate activities and processes to improve overall performance. This new offering applies these principles wherever energy and water are used throughout a client’s operations -- transportation systems, datacenters and IT systems, manufacturing and distribution centers, office facilities, retail space, research and development sites, etc.

IBM News release (Aug 18, 2008) says, ‘the constraints and costs of energy and water usage are rising at an accelerating rate, with a significant impact on business operations and financial performance. In addition, companies are coming under increasing pressure from governments, advocacy groups, investors, prospective employees, and consumers to make their operations, products and services more socially responsible, particularly regarding the environment.

IBM’s own conservation efforts have saved 4.6 billion kWh of electricity and $310 million in costs, and avoided over three million metric tons of CO₂ emissions since 1990. The company’s work-at-home program for employees saves roughly eight million gallons of gasoline annually’.

Green Sigma Approach

Quality Digest (2008) elaborates a five-phase approach of Green Sigma to an organization’s operations and environmental practices:

- Establish key performance indicators defined and tailored to the client’s operational environment, industry and business. Activities include building key process indicator sets for carbon and water, including regulatory and stakeholder requirements;
- Identify areas where activities and practices should be measured. This can include developing a facilities management plan and determining where to use sensors to collect information for analysis;
- Use a Carbon and Water Management Dashboard system to monitor key performance indicators and analyze performance data. This can be linked to other systems to help initiate processes such as carbon trading;
- Apply GreenSigma statistical tools and techniques to analyze and improve processes to reduce energy usage, carbon emissions and water inefficiencies;
- Create ongoing optimization of processes and key performance indicators through the Carbon and Water Management Dashboard, and identifying new areas where improvements can be made.

GreenSigma Method

Green Sigma (2012b) is applying proven industry principles and tools on environmental protection and energy efficiency. This includes:
Lean Production / Lean Manufacturing
strives for continual improvement of lean processes by driving out waste

Six Sigma
A data driven method for radical improvements

Environmental Management
A method to systematically prevent environmental damage in the industry, standardized via ISO 14000

Green Sigma Principles
1. Combination of methods
The applied methods are designed for specific industry tasks. They are exceptionally strong in combination.

2. Continual improvement
Mankind is growing and so do our demands. So we need to become better and better no matter how good we are today.

3. Fact-based decision making
Our abilities to improve are limited. So we need to concentrate on the vital few things and leave the trivial many. Figures can help identify them.

4. Accountability and responsibility
Waste of energy and resources are far more common in areas where the ones who control the waste are not the ones who suffer from it. Bridging this gap is the key.

5. Everybody can contribute
Our environmental and climate issue is caused by all of us - and so can only be tackled by all of us. The sum of all tiny contributions can be immense. To wait until somebody else acts first is just a lame excuse.

Green Sigma Tools
The list of tools below provided by GreenSigma (2012b) should just give an idea on what main tools and further tools that can be applied in a green way:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Brief Description</th>
<th>GreenSigma Example</th>
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<tbody>
<tr>
<td>Frequency Relevancy Analysis of Problems</td>
<td>Prioritization technique: Matrix of problems showing their frequency (i.e. how often a problem occurs) on the vertical axis and the relevancy or severity of each of the problems on the horizontal axis. Problems with both a high frequency and relevancy need to be tackled first.</td>
<td>Electrical energy waste in private households: What causes more waste: The pizza oven with 3kW running once a week for an hour or 10 standby devices with 5W each running all the time?</td>
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<tr>
<td>(FRAP)</td>
<td></td>
<td>Keep the fridge defrosted and the recuperator clean in order to minimize the compressor's energy consumption and increase its lifespan</td>
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<td>Total Productive Maintenance (TPM)</td>
<td>TPM is a maintenance program concept to prevent defects, waste and down times and extend the life of the equipment by raising awareness and empowering employees to initiate corrective action</td>
<td>Landlords often rent out their properties &quot;cold&quot;. So they have no interest in a better insulation. So they have control over the majority of the heating waste. If they would participate from the saved energy they would be willing to invest in a better insulation.</td>
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<tr>
<td>Incentives</td>
<td>Incentives can bridge the gap between having control over an issue and being accountable for it</td>
<td></td>
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Further Green Sigma tools:
Some other significant tools of Green Sigma are listed below:

Table 2. Further Tools provided by Green Sigma

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Green Sigma tools</th>
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<tbody>
<tr>
<td>1.</td>
<td>5 Why Analysis</td>
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<td>2.</td>
<td>SS</td>
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<td>3.</td>
<td>7 Wastes</td>
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<td>4.</td>
<td>Asset reduction</td>
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<td>5.</td>
<td>Audits</td>
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<td>6.</td>
<td>Benchmarking</td>
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<td>7.</td>
<td>Cause and Effect Diagram (Ishikawa Diagram)</td>
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<td>8.</td>
<td>Continuation</td>
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<td>9.</td>
<td>Control Plan</td>
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<td>10.</td>
<td>Correlation Analysis</td>
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<td>11.</td>
<td>Cost of Poor Quality (CoPQ) Calculation</td>
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<td>12.</td>
<td>Critical to Environment (CtE)</td>
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<td>13.</td>
<td>Design of Experiments (DoE)</td>
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<td>14.</td>
<td>Error Proofing, Poka Yoke</td>
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<td>15.</td>
<td>Failure Mode and Effects Analysis (FMEA)</td>
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<td>16.</td>
<td>Force Field Analysis</td>
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<td>17.</td>
<td>Gauge R&amp;R</td>
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<td>Pareto Analysis</td>
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<td>Process Modeling / Process Mapping</td>
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<td>25.</td>
<td>Product Line Analysis (PLA)</td>
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<td>26.</td>
<td>Quality Function Deployment (QFD)</td>
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<td>27.</td>
<td>Recycling-oriented Product Design</td>
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<td>28.</td>
<td>Relation Diagram</td>
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<td>29.</td>
<td>Single Minute Exchange of Die (SMED)</td>
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<td>30.</td>
<td>Stakeholder Grid</td>
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<td>31.</td>
<td>Standardizing</td>
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<td>Statistical Process Control (SPC)</td>
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<td>Supply and Demand Analysis</td>
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<td>Theory of solving inventor's problems (TRIZ)</td>
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<td>36.</td>
<td>Tick Sheets</td>
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<td>37.</td>
<td>Total Productive Maintenance (TPM)</td>
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<td>38.</td>
<td>Upside/Downside Matrix for Changes</td>
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<td>39.</td>
<td>Value Analysis</td>
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<td>40.</td>
<td>Value Stream Mapping (VSM)</td>
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<td>41.</td>
<td>Visual Management</td>
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Conclusions

Nowadays, organizations are focused on environmental and social responsibility as a strategic objective. There is a lot of pressure from governmental and societal bodies to reduce employee carbon footprints. Various stakeholders too, are insisting on these issues. These concerns are forcing the organizations to go for greener alternatives. HRM, being the torch bearer of such initiatives has the responsibility to address these issues. Sustainability being the strategic objective, organizations are looking for the solutions to optimize their operations to improve environmental and social outcomes with positive impact on their bottom line as well. Measurability of employee carbon footprint and saving in costs to the organization makes the use of Six Sigma imperative. Six Sigma philosophy can play an active role to transform the industry by exploring greener alternatives of its processes. Green Sigma by IBM is great hope in this direction.

References