Chapter 41
Supply Chain Optimization Audit (SCOA) for Green ICT Opportunities

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ABSTRACT

Green ICT is a lot more than efficient air-conditioning of data centers and switching off monitors and desktop PCs. ICT has the ability to give rise to and continuously enable energy saving on a scale 50 to 100 times bigger by becoming the technology that detects and prevents process inefficiency of energy intensive supply chains. Energy efficiency that can only be sustainably achieved as a result of using ICT creatively is outlined in this chapter. The authors consider the optimization of supply chain as a crucial enabler of the overall effort of an organization to improve its environmental credentials. Therefore, undertaking the audits of an organization's supply chains, and ensuring that the end result improves its efficiency is one way of limiting the carbon generated during its activities.

INTRODUCTION

Consider this fact: All the desktop PCs of a 10000 man steel manufacturing company collectively use 2000 kilo watts or **2MW** of power assuming each pc and monitor draw 200watts. The same company may produce 20000 tonnes of steel a day at an energy use intensity of 25GJ/tonne. This works out to an average energy consumption of 5787 MW If ICT can facilitate a 2% reduction in energy use this works out to **116**MW. The average energy consumption in the steel company that is being used as a test case works out to =20000 (tonnes/day) *25 (GJ/tonne) *1000 (MJ/GJ) / (24*3600) (seconds/day) = 5787MW

So it is not hard to see that any ICT driven supply chain efficiency improvement has a much bigger *Green* bang for the buck. Any reduction in energy use while maintaining the same production is a green improvement. The fact that supply chain energy efficiency and material loss reduction is far more valuable than dealing with end user desktops and laptops, this chapter talks about a SCOA a new way of looking at auditing

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supply chains to uncover energy and material savings. The chapter also uses three case studies to illustrate the techniques outlined in the SCOA methodology

All supply chains and particularly those in a large manufacturing enterprise are actually made up of two parallel supply chains which run together: the supply chains of energy and the supply chains of material. Some may argue the measured continuous information about the material and energy supply chain flows is also a supply chain of information even though it is of a secondary nature.

The actual value flowing through the supply chains of a large enterprise is between 2 to 5 times the actual turnovers of a typical enterprise. This is not hard to imagine when you visualize the different stages of transformation that the input raw materials are subject to, as well as the number of stages and the extent of transformation in each stage.

A 1% reduction in the loss or its conjugate that is 1% improvement in the yield in every supply chain is logically equivalent to 2% to 5% of the turnover. For an enterprise which makes a profit equal to 15% of the turnover this improvement can be worth 33% increase in the profits. The profit ratio of 15% of turnover has been harvested from the EBITDA in 2008 financial results for BlueScope Steel. It is not difficult now to see the importance in seeking to improve the efficiency of each major supply chain. While loss reduction via the discovery of suboptimal operational sequences and scenarios in an important source of improvement it is not the only one.

It is just as important to detect quickly any departure from the best practice in major supply chains and to seek out the root cause and fix it quickly before this can make a major impact on the bottom line. ICT can play a critical role in facilitating and enabling this. Surprisingly there is still scope to build domain focused best practice dashboards and other tools, as in the past these were not done since energy was cheap and the focus was on producing more rather than producing efficiently.

Each major supply chain can be decomposed into smaller ones at the level on a unit. In each these of these smaller supply chains there is a concept of best practice yield and conversion cost. Energy used in the unit operation and any additional inputs and labour make up the conversion cost.

It is of great economic importance that the yield and conversion cost in each supply chain be kept as close to the best practice as possible. However the concept of best practice for an individual supply chain is not always the best possible yield or least conversion cost. Though counter intuitive this can be explained.

The most optimal economic outcome for the entire enterprise may require levels of operation of individual; supply chains which are individually sub optimal.

This is how ever not hard to understand. Consider a scenario where due to a global down turn the demand had dropped depressing the sale price below cost. In this situation the most optimal enterprise setting is to cut production down to the minimum levels at which the process can safely run, assuming full shutdowns are an expensive option. In such a scenario nearly all supply chains will need to run sub optimally.

Though a crude example, it illustrates the fact that that global enterprise wide optimal solution may require suboptimal settings in the different supply chains that make up the whole. Further that these suboptimal settings though they represent the best practice at that point are not constant. The best practice setting for each supply chain will change with the global optimum setting.

The global optimal setting often relates to the level of production which after being adjusted for existing inventory of finished\ product, will supply the required market demand.

So the best practice yields and conversion cost in terms of energy and other inputs is thus a set of loading curves. Where the best practice is the