A New Perspective on Enterprise Resource Management

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Information systems are designed to help companies use enterprise resources more efficiently. But what if companies us information systems more broadly — not just to measure profit but also to account for the needs of people and the environment

Consumers today are concerned with more than just quality and price. Increasingly, they also care about the social and environmental impacts of products. Indeed, many ask questions like: Does this toy contain toxic substances? Where do the materials in this garment come from? Do manufacturers take occupational safety practices in their factories seriously enough? And are the production processes environmentally friendly?

Being able to answer questions about the safety and environmental effects of products we use is critical. However, without the right information, even seemingly easy questions are difficult to answer. We send spacecrafts to Mars, but we know embarrassingly little about everyday products we use. Although we produce huge quantities of data every second, we frequently lack the relevant and actionable data points to respond to simple questions people have about what products

are made of and how they are made.

Recent surveys (including those published by *MIT Sloan Management Review* **(http://sloanreview.mit.edu/projects /sustainabilitys-next-frontier/)**) find that most executives believe that sustainability has a permanent place on the corporate agenda. However, today's IT systems don't sufficiently support companies that are seeking to understand and manage the full impact of their activities throughout the extended value chain. This helps to explain why sustainability has not yet become fully integrated into core business strategies.

Danone, a multinational food company based in Paris, uses its enterprise systems to analyze and measure the sustainability impact of products.

Image courtesy of Flickr user Whitneyinchicago.

Classical IT systems for enterprise resource planning (ERP) have significantly improved business processes and the management of enterprise resources. ERP today provides an integrated view of core business processes across various departments, ranging from sourcing, manufacturing and sales to accounting and payroll. As such, it is the nerve center and system of record for many businesses.

However, nonfinancial measures (such as the amount of energy or water consumed during a production step) are hardly considered in conventional ERP. After all, corporate managers are trained and incentivized to optimize financial assets, labor costs and capabilities, and materials. In our view, a more adequate approach to ERP would take into account the full range of resources, including environmental and social ones, as well as covering all phases of the value chain reaching beyond company boundaries. This approach would consider, among other things, where the substances and raw materials that make a product come from; how much energy is required to manufacture the product; how much waste and emissions various steps generate; and the extent to which the suppliers' business practices align with human rights and labor standards.

For the most part, today's information systems and reporting methods treat factors such as emissions, waste and employee protections as externalities. But many factors, including economic uncertainty, population growth, climate change and escalating demand for natural resources, are placing new pressures on companies to take a broader set of considerations into account when making decisions. Information systems should help companies assess and disclose the impacts that their extended value chains have not only on financial performance, but also on what some refer to as "the triple bottom line **(http://www.economist.com/node/14301663)**": environment, society and the economy.

Although some analysts maintain that organizations can gain competitive advantage by focusing on sustainability, this view may be premature, particularly in the absence of reliable information systems can provide a comprehensive view of how enterprise resources are being managed. The UN Global Compact-Accenture CEO Study on Sustainability 2013 **(http://www.accenture.com/Microsites**

for example, concluded that the direct business benefits for individual organizations emphasizing sustainability will be limited in the near term. The study, which surveyed more than 1,000 top executives in 103 countries, called for "innovating new systems, marke and structures" and a "new commitment to collaboration" beyond individual organizations.

Governments in regions such as Europe and New Zealand have already started to internalize environmental costs by making polluters pay and putting a price tag on emissions, waste and pollutio We think companies that will emerge as leaders will be those that learn to manage their resources bet than their competitors do. They will require new tools and information to monitor activities througho the sourcing, production, distribution, sales and post-sales processes.

From Linear to Circular Economies

Previously, companies seeking to adopt cleaner and more sustainable business practices focused on specific parts of the problem — for example, reducing the amount of smoke coming out of the smokes of their factories. But concentrating on "end-of-pipe" technologies is suboptimal. In the linear value c old products ended up in landfills even though some of the materials (such as the gold contained in electronics products) are valuable. In a circular economy, by contrast, discarded outputs can be recla through take-back, recycling, reuse and remanufacturing programs and then redirected into producti processes to make new products. In addition, take-back and recycling programs can provide valuable feedback about how a product performs in the field and how it was used, which can inform future des and production decisions.

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What's needed are measurable processes that promote reuse. A company's impacts have to be measur against the contributions of its products and services. Currently, most companies directly control onl

about 10% to 20% of the environmental footprints of the products they sell; the rest is linked to upstream suppliers or downstream activities. In our view, a realistic economic model should reflect the full range of an organization's activities, from the original sourcing of materials through the very end of the product life cycle.

To be sure, it is difficult to track the genealogy of products or substances all the way back to the raw materials and all the way forward to what happens after their useful life. However, if we really want to promote more sustainable consumption, we must improve transparency across the value chain so that companies are incentivized to change. The International Organization for Standardization (http://www.iso.org/iso/), based in Geneva, Switzerland, has published several standards that promote an integrated, life-cycle view of products. Designers and engineers should be encouraged to n decisions not only according to form, fit and function but also based on the properties of the materials where they come from, the energy required to produce products, and so on. Retailers and other comp need to build these principles into their purchasing criteria. Wal-Mart Stores Inc. has already taken so noteworthy steps. Partly through its participation in The Sustainability Consortium, an international nonprofit seeking to build a scientific foundation to improve consumer product sustainability, Wal-M hoping to become a leader in minimizing social and environmental business impact. By the end of 20 Wal-Mart has pledged to buy 70% of the goods it sells in its U.S. stores and Sam's Club locations from suppliers who use the consortium's index to evaluate and share sustainability data about their produ Wal-Mart also plans to use the index data to influence the design of its U.S. private-label products.

Optimizing Sustainability Performance

Pulling together reliable nonfinancial data on materials and processes is no easy task. Many large reta and manufacturers ask their suppliers to record relevant sustainability product data on a technology platform. However, the result is often an array of platforms that suppliers must maintain for different customers. Shifting to shared data networks in the cloud would streamline the process, allowing companies to track information more easily and at lower cost. Indeed, the utility of shared data netwo would grow as the number of participants increases. It would enable efficient collection, management reuse of sustainability data relating to products, while saving time and money for all network particip

As companies are able to pull carbon and water footprint details from their supply chains, they will ne to integrate that information with internal data from their own processes. Production orders and logis processes generated by ERP systems may already have this capability. But even so, chances are that t current systems don't take proper advantage of it. To do so requires opening up bills of materials (in c words, the complete lists of raw materials, parts and preproducts needed for manufacture — lists that sometimes encompasses thousands of items) as well as master data for tracking everything at once. In many instances, this will also require new or adjusted accounting methods.

Developing the ability to create aggregated views from

existing ERP systems is key to optimizing sustainability performance. Danone, a multinational food company based in Paris, and Stonyfield Farm Inc., a yogurt maker based in Londonderry, New Hampshire, that is majority owned by Danone, are examples of organizations that analyze and measure product-level sustainability impacts across products and sites using information from existing enterprise systems. When their existing enterprise systems receive production orders, both Danone and Stonyfield are able to begin calculating the associated carbon emissions and water consumption. Their managers can measure emission impacts and energy and water consumption in real time; for example, they can examine the impact of mitigation strategies such as material replacement, alternative transportation or the introduction of new types of renewabl

Wood Turner, vice president of sustainability innovation for Sto says the yogurt company is focused on finding creative ways to the triple bottom line of financial, social and environmental responsibility. (Watch the full video here)

The importance of such capabilities cannot be overstated. Having aggregated views allows companies optimize performance across suppliers, organizational entities, production lines and product categori a scalable and effective manner. Once production, logistics scheduling and planning are optimized wi lower emissions, reduced energy consumption and less waste, companies can identify opportunities to generate long-term sustainable value. Using this approach, Danone analyzes 35,000 products on a monthly basis and has achieved emission reductions in excess of 35%. For its part, Stonyfield saw a 4 reduction in transportation-related greenhouse gas emissions from 2006 to 2010, creating $7.6 milli savings.

The Case for Integrated Reporting

The changing business environment is creating an incentive for management to adopt a new approach enterprise resource accounting. Rather than focusing on financial performance alone, management n to be able to monitor and manage both financial and nonfinancial aspects along the entire value chai from design, supply chain and operations to consumer purchasing and end of life. The goal is to comb financial and nonfinancial facts and figures in one report. The rationale is that neither the corporate financial reports nor the increasingly popular sustainability reports provide a comprehensive view of a company's value and performance; until the two views come together, both types of reports are incomplete.

As strong as the case for integrated reporting may be, implementing it is still difficult; the quality, reliability and frequency of nonfinancial data remain inferior to those of financial data. Until enterpri

systems can generate current data about emissions, resource consumption or social impacts, it will be

difficult to report on the relationships between nonfinancial and financial indicators (for example, employee satisfaction and revenue, carbon emissions and costs, or labor standards and brand value). Integrated reports require adjustments of existing accounting and controlling frameworks. And they require that today's externalities be embedded into the business' standardized resource planning and optimization processes.

The way businesses currently measure environmental and social impact is simply not good enough. There is a strong need to expand existing business software solutions to help address social and environmental goals. Addressing sustainability challenges while maintaining economic growth and improving quality of life is one of the fundamental challenges of the 21st century. Information technologies and enterprise solutions, which have contributed significantly to growth in recent decades, can assist in this effort, too. What if we used our technology advancements in big data, mobile, analytics and enterprise applications to address the sustainability challenges we have described — and in the process transformed industries and markets for long-term value creation?

However, to establish a new paradigm of enterprise resource management, our business processes must change. The old paradigm will not be able to meet the new challenges. Leaders need to get the right tools in place so they can lead the change.

Managers shouldn't see embedding sustainability elements into enterprise systems as an obligation. Rather, they should view it as an opportunity to drive continuous improvement toward addressing the big challenges that humanity faces. Just as business networks become stronger with every participant, creating sustainable businesses will require collaborative efforts that take into account the needs of companies to earn profits while also protecting the health of people and the planet.

Further Reading From the *MIT SMR* Archives

Q&A with R. Eccles (Harvard Business School), "Get Ready: Mandated Integrated Reporting Is The Future of Corporate Reporting"

Q&A with J. Pflueger (Dell), "How Dell Turned Bamboo and Mushrooms Into Environmental-Friendl Packaging"

D. Gallagher, "Reducing Yogurt's Carbon Footprint"

R. Eccles et al., "How to Become a Sustainable Company"

Q&A with B. Blaisdell (Timberland LLC), "New Ways to Engage Employees, Suppliers and Competito CSR"

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