The frontiers of eBusiness technology and supply chains

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Abstract
This article is an Introduction to this Special Issue on “eBusiness and Supply Chain Management.” It also provides a vision for eBusiness and supply chain for the future.
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1. Introduction

Henry David Thoreau, arguably one of the greatest thinkers of his time said of Samuel Morse’s invention of the telegraph:

“We are in great haste to construct a magnetic telegraph from Maine to Texas; but Maine and Texas, it may be, have nothing important to communicate.”

Just like the telegraph and the railroads in the mid-nineteenth century, the Internet, and indeed, digitally enabled technologies, has fundamentally changed how businesses manage their supply chains. When Samuel Morse sent his first telegraphic message “What has God Wrought?” in 1844 (from the Book of Numbers) little did he imagine the magnitude and scope of change created by information technology (compare Morse’s message to Wal-Mart’s data warehouse which exceeds half a petabyte!)

The times they are changing!

For the purposes of this Special Issue, we define eBusiness technologies as the use of the Internet or any digitally enabled inter- or intra-organizational information technology to accomplish business processes. Over the last decade, such technologies, specifically the Web, have revolutionized supply chain design, management, and control. They have enabled a paradigm shift from inventory to information; from competition to collaboration; and from cost to value.

eBusiness technologies have permeated every supply chain process. Products are collaboratively designed on the Web; procurement software and exchanges have streamlined purchasing and reduced transaction costs; ERP systems have codified, standardized, and automated data storage and retrieval; collaborative technology has enhanced supply chain visibility and has made the distribution of products and services efficient; and communication technologies have improved customer relationships and marketing strategies.

While eBusiness technologies bring with them the promise of lean and efficient supply chains, companies that use them need to address several issues before its potential is fully realized. They need to decide, among others, which technologies to use and how; the scope of collaboration with trading partners; the quantity and...
type of information to share; which products to
collaboratively design; which distribution channels to
use; and how to measure performance. The issues are
multifaceted and resolving them is a complex and
enduring process.

The intent of this Special Issue is to address some of
these issues. Our call was to “publish papers that
address the cutting-edge of this nexus between
eBusiness and supply chain management.” While there
have been several Special Issues on eBusiness and
Supply Chain, papers in this Issue, in addition to
updating the state-of-art research, showcase the primary
methodological focus of this journal—Empirical and
Case Study Based Methods. The response to our call
was enthusiastic. We had 45 submissions for the Special
Issue. After an initial editorial review, we put 36 papers
into the review process. The papers in this Special Issue
were chosen from these 36 papers. All papers went
through at least two rounds of revisions, with some
requiring more revisions prior to acceptance.

2. Supply Chains & Digital Technologies: a
vision

We see eBusiness technologies impacting supply
chains significantly in four areas. These areas are
more “process-oriented”—a single technology (like
RFID, for example) can impact processes in all these
areas.4

2.1. The Product Design Cycle

eBusiness technologies have impacted product
design processes in three ways. First, to manage
shrinking product life cycles, suppliers, and manufac-
turers are sharing design and engineering information
over the Internet in the early stages of product
development. The premise of such web-based colla-
boration is faster time-to-market, quicker upgrades,
efficient life cycle management, and the elimination of
unnecessary inventory. Companies in a wide variety of
industries—Lucent, Adaptec and Cisco in the hi-tech
industry; GAP and Land’s End in the fashion industry;
and Dana Corporation in the automotive parts are
already embracing principles of web-based design
collaboration to accelerate product development cycles.

Second, many companies are finding ways to
reconfigure products quickly to better match supply
and demand. Some, like the Spanish retailer Zara, are
pre-positioning assets (such as manufacturing capacity,
semi-finished goods) across the supply chain and when
demand is realized, they marshal these assets to make
and deliver the product or service. Still others, like Dell
and Hewlett-Packard, are postponing the final custom-
ization of the product until demand is known.

Third, sustainability is quickly becoming an impor-
tant aspect of product design. Internet-based technol-
gies are helping supply chains reorganize to manage
the “reverse loop”—from maintenance and after-sales
service, eventually to recovery after end-of-use.

2.2. Collaborative Planning & Logistics

Firms have long realized that collaborating on
procurement and replenishment increases product
velocity while improving efficiency. Examples include
vendor-managed inventory (VMI) agreements in the
consumer products industry; Efficient Customer
Response (ECR) initiatives in the grocery industry;
and Quick Response in the Apparel industry. The latest
Internet-enabled initiative is Collaborative Planning,
Forecasting, and Replenishment (CPFR) whose central
premise is that short- and long-term information
regarding POS data, forecasts, shipping, and production
plans; and order generation, is shared by supply chain
partners over the Internet, who in turn use the
information for joint planning.

Over the last 10 years, electronic marketplaces have
brought with them the ability to bring multiple buyers
and sellers to an Internet site to transact. In addition to
providing new channels of procurement, marketplaces
have reduced the cost of identifying, certifying,
transacting with and evaluating suppliers. The next
wave of supply chain processes hope to combine the
depth of CPFR-like initiatives with the scope of
electronic markets, bringing a multitude of players –
suppliers, manufacturers, retailers, 3Pls, etc. – sharing
information and transacting in real-time.

2.3. Streamlining the order management cycle

The order management cycle (OMC) is the manage-
ment of a customer order from the time it is placed to the
time the product is delivered to the customer. This
includes order preparation, transmittal, order picking,
and packing, and eventually transporting it to the
customer. Often the cycle extends beyond delivery to
include after-sales service and product end-of-use.

3 See for example Production and Operations Management Journal,
2002, 11, 4; Decision Sciences Journal, 2002, 33, 4; Interfaces, 2001,
31, 2.

4 See also Ganeshan (2000) “Plugging in the Supply Chain” at
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recovery. The OMC has received renewed scrutiny with the realization that any delay in the OMC translates directly into delays for the customer.

The latest technology-enabled trend in managing the OMC is two-pronged: first, Customer Management Tools (like CRM & Demand management software) are making it possible to understand, market to, and serve the customer better. Second, an evolving trend in managing the OMC is the concept of “fulfillment at web-speed.” The concept involves being connected, via open standards such as the Internet or even wireless devices, in real-time to suppliers, 3PLs, carriers, and customers. This enables every player in the fulfillment process to access dynamic information that can be used to speed the product to the customer.

2.4. Supply Chain Metrics

Performance measurement in the supply chain is evolving from traditional product-based functional financial measures internal to the firm to a “dashboard” of financial, time, logistical, and service measures that span every link in the supply process. Since the supply chain usually involves more than one firm, it is important for managers to evaluate what every firm brings in terms of costs and benefits to the supply chain; and eventually how such benefits can be shared between supply chain partners. This often necessitates a different organizational structure—cross-functional and inter-firm teams that analyze, monitor, and improve supply chain processes. Such a process or activity-based performance evaluation requires the use of several sophisticated real-time data warehouses and complex costing techniques that span multiple companies (often shared in real-time). In addition to process-based measures, shared data warehouses also aid in the computation of overall Supply Chain Metrics such as service levels and “life-time profitability” by customer segment, time through the OMC (or supply chain velocity), Economic Value Added, and Return on Investment.

3. Papers in this issue

These four areas provide a general framework for supply chain transformation. Many salient issues – and consequently the papers in this Special Issue—span multiple areas. Table 1 classifies the papers in this Special Issue based on the four broad areas discussed above. We also indicate the key research question and the research method used to answer the question.

The papers in Table 1 are the result of 2 years of revisions and reviews and we thank all the authors and reviewers for making this a success! As many of the papers in this Issue suggest, there still are a multitude of issues that need to be addressed and we hope that this Special Issue spurs further interest in the eBusiness/Supply chain area.

Thoreau would be glad: Maine and Texas have a lot to say to each other after all!