15.778, Summer 2004
Prof. Gabriel Bitran

Lecture 2: Supply Chain Management: Logistics

Guest Speaker: Prof. Yossi Sheffi, MIT Center for Transportation and Zaragoza Alliance

Class Outline

Zaragoza Alliance
RFID Potential in Supply Chain Management

Zaragoza Alliance

"The MIT-Zaragoza International Logistics Program is a research and education partnership of MIT, the University of Zaragoza, the government of Aragón (Spain), and the logistics companies of PLAZA, a state-of-the-art logistics park now being constructed in Aragón's capital city of Zaragoza. The education program will offer a master of engineering in logistics, a doctoral degree, and a set of executive education courses leading to certificates in various logistics-related disciplines. The research program will use the logistics park as a working laboratory to experiment with new logistics processes, concepts, and technologies." Source: MIT Facts 2004, http://web.mit.edu/facts/partnerships.shtml (accessed July 26, 2004)

RFID Potential in Supply Chain Management

- Is a potential disruptive step (from a technological viewpoint) for operations managers.

- RFID belongs to a family of automatic identification: a way to identify objects without direct human intervention. The potential for low costs of automatically identifying items has made it an exciting prospect today.

- Best known part of Auto ID family is the bar code. There are others, though, including:
    o Truck identification – one the high end of the family; antenna talks to a satellite using GPS. A driver can put in requests and headquarters can give directions.
    o In Boston races and marathons, they now tie a low-cost plastic RFID tags to shoes of runners. Runners can see their own time every mile mark, and families can track them on the Web.
    o MIT ID card
    o Traffic toll paying
    o Higher frequency usually means a higher cost and longer distance.

- System architecture: a tag is placed on item, read by a reader, data sent to database. It can then be correlated with other information in database. Reader can read from within 3-5 feet (you may in reality not want to read at longer distances).
    o WORM ("write once, read many"): in current systems, all information about product is stamped once at beginning of process.
    o Smarter tags can pick up information as they go through the supply chain, though it's currently more expensive to do that. An example is the ability to see how long a carton of milk has been in transit or if it has been exposed to hot temperatures.
    o There is a unique naming convention for these tags, similar to bar codes

- Why are we interested in Auto ID? We already have bar codes, which are inexpensive and accurate.
    o Deliberate scan vs. automatic scan

- o Problem with accuracy of human bar code scanners (they might circumvent bar code system by entering 3 t-shirts on the keypad instead of scanning the three items)
  - o Line of sight vs. random orientation (in theory): makes for faster processing, can read through conveyance walls, is weather resistant
  - o Capability to have a unique item identifier for every item on earth
  - o Future capabilities: location information, WMRM ("write many read many")

- What about security?
  - o Can you drive by a factory or store and scan all their merchandise to get competitive advantage? It may be possible, but you would need to know their codes. Companies may also choose to put up protection.
  - o Chip can be "killed" with no possibility of being reactivated. This may alleviate privacy concerns if the tag is deactivated when leaving the store.

- Possible benefits of Auto ID:
  - o Accurate advanced shipping notice
  - o Sub-conveyance tracking of things in closed loop (items that need to be returned to suppliers), such as Courage Brewing tracking beer kegs and Marks & Spencer tracking food trays
  - o Tracking packages is not uniform today: you can track UPS package but not a custom built car that is being shipped to customer. In construction, material arrival date is often biggest risk, so some large construction projects have used this technology.
  - o Verification and proof that item was delivered, especially for retailers and suppliers, who take deductions for late deliveries. Wal-Mart takes deductions but gives money to charity. Other companies have employees that take revenue from these problems in supply chain.
  - o Warehousing, having continuous inventory
  - o Retail stores can be out of stock less frequently. Also, can reduce problem of "phantom stock", where the inventory is in the store, but it cannot be found (a major problem for large bookstores)
  - o Easier recalls (example: pharmaceutical companies)
  - o Piracy detection (example: Intel putting tags on their chips to see if people over clocked the chips before they burned out)

- Retail examples:
  - o Wal-Mart – by 2006, every supplier to Wal-Mart needs to have tags on their shipments

- A few possible future applications:
  - o You can tell how much life is left on your computer's hard drive (or any other piece)
  - o TV dinners can tell the microwave how long to cook them
  - o Refrigerator can automatically tell the store when to replenish items or tell you when food expires
  - o New designs of warehouses to maximize the Auto ID tags
  - o Real-time personalized pricing in stores

Summary
We are on verge of a societal revolution perhaps bigger than the Internet. We will be able to have a different sense of our environments, especially if the Auto ID technology is paired with other technologies.