

Would Macy's Scan Gimbels? Competitive Intelligence and RFID

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Abstract

The paper speculates on some potential impacts of the advent of radio-frequency identification (RFID) technologies on retail stores in areas of competitive intelligence, and new availability of information within and about supply chains. The assessment is largely from the point of view of the retailer, and is intended to outline a number of hypotheses.

This paper is intended more to raise questions than to posit answers, although one plausible strategy for retailer management of RFID, in light of the risk of disclosure of competitive intelligence, is suggested (a recoding strategy).

In-Store Scenarios

Various scenarios outlining the value of RFID for in-store intelligence collection by the retailer can be turned on their heads as prospective scenarios for competitive intelligence conducted by others:

Consumer goods companies, such as Gillette and Procter & Gamble, say they are interested in smart shelves as a tool to help increase sales by ensuring that store shelves are always stocked with their products. With stock levels being continuously monitored by computers receiving wireless signals from the products themselves, retailers would no longer have to rely on employees to monitor their shelves.¹

One retailer is already experimenting with inventory control using RFID tags. By placing RFID readers on its store shelves, the retailer can identify low stock items, analyze traffic and purchase patterns, and identify potential theft of its products.²

In theory, all of the same information collection might be accomplished by any other party, for the cost of moving a reader through the same retail store; one would perform

¹ <http://zdnet.com.com/2100-1103-979710.html>, "Retailers take stock of 'smart shelves'", January 8, 2003.

² http://techrepublic.com.com/5100-6296_11-5054050.html, "The corporate impact of real-time inventory tracking", August 12, 2003.

surveys over time to construct a longitudinal profile of the flow of products off of shelves, and the appearance of new stock.

So we might anticipate competitive intelligence collection among retailers, e.g., sending an “agent” to monitor a competitor’s inventory. (NB: Anything that might be done via RFID tomorrow would be possible today, by visually examining shelves, recording product serials, etc.; in this case, the quantitative changes -- the ability to scan a whole aisle by merely walking its length with a reader hidden in a backpack -- makes for an enormous difference in feasibility.)

There would be major questions of practicality and, potentially, legality.

We might anticipate a variety of future means to collect RFID data, more imaginative than secreting a complete tag reader in a backpack, e.g., passive listening as tags are read by the store’s own readers, perhaps even collection of signals from outside of the store itself. While read distance may be fairly limited today, innovative use of technology might permit a greater “stand off” distance.³

While end consumers (the celebrated Joe Sixpack) likely won’t be equipped with RFID readers any time soon, it’s worth anticipating that what is now available only as specialized equipment may eventually be merged into end-consumer communication equipment. Motorola, Symbol and Nextel have announced (optical) bar code reader modules for cell phones⁴, and efforts such as Microsoft’s AURA project are experimenting with end-user annotation of physical spaces, through web logs, and scannable tags (such as bar codes, including product UPCs), using standard commercial PDAs with attached readers⁵.

While a good many end-consumer UPC scanning service ventures have been launched only to falter or fail (DigitalConvergence, Airclic, Barpoint, IQorder, and others), consuming in excess of half a billion dollars of venture capital funding in the process, some may eventually succeed, as some of the factors that produced the earlier failures change, e.g., pervasiveness of Net-accessible PDAs and cellular phones, cost of add-ons to enable scanning, etc. All of these services were, on balance, disadvantageous to “brick and mortar” retailers, e.g., encouraged use of such retailers as physical showrooms on behalf of Internet-only retailers with consequently lower prices, or offered third-party information not necessarily in the retailer’s interest to present.

³ Vivato (<http://www.vivato.net>) is a WiFi equipment provider, whose products use directional antennas based on phased arrays to provide connectivity (normally limited to hundreds of meters, with omnidirectional antennas) out to several kilometers. Similar innovation in RFID interrogation might allow for reading of tags from a sufficient distance to avoid issues of physical trespass, in collecting product intelligence.

⁴ http://biz.yahoo.com/bw/030613/135307_1.html, " Nextel, Motorola and Symbol Technologies Offer First Wireless Bar Code Scanner for Mobile Phones ," June 11, 2003.

⁵ <http://aura.research.microsoft.com/aura/AuraPortal/>

Other Sources of Competitive Intelligence

Management of the Object Name Service (ONS) specified in the Electronic Product Code (EPC) architecture could also have a significant impact on the availability of competitive intelligence on retailers' operations (and the whole of any supply chains relying on use of EPC). The ONS provider or providers will be party to a tremendous volume of transactions, as manufacturers, retailers, and others up and down the supply chain make product inquiries, whether on the status of specific items, or at a higher level (e.g., to fetch product descriptive information to populate an in-store customer information service, or to create content pages on a store web site).

Ideally, for all of the content-exchanging parties, all transactions would be confidential to the parties, with no transactional information retained by the ONS service providers (other than what might be required for billing for services); practically, it would seem likely that the latter will attempt to reserve the right to monetize transaction logs, e.g., through analysis and sale of aggregated statistics.

If the medium for the retailer's inquiries is the open Internet, any exchanges should ideally be encrypted, or otherwise protected from interception. The truly paranoid user of ONS services might employ a proxy, to obfuscate the source of the inquiry.

So, Who Wants to Know?

Competitive intelligence, on the inventory of a retailer, both its type, and turnover, may be of interest to retail competitors, to suppliers, and to manufacturers, as well as to third-party companies collecting data for analysis.

NB: EPC scanning in the store would only provide unique identifiers of tagged items, though that is sufficient to identify the manufacturer, and product type -- through repeat scans over time, one could gauge product turnover. EPC scanning alone would reveal nothing regarding product pricing.

Some of the discussion of the value of RFID in the stores presumes an effective flow of transactional information back to manufacturers, allowing them to make "just in time" decisions on production--we ought to question how likely this is to occur, given the complexity of system interaction, and the information economy: will manufacturers really provide incentives to retailers for such reporting?

The Value of Functional Tags on the Shelves

Consumer goods in retail stores might be separated into four categories:

- Items without tags, which the retailer has no interest in monitoring;
- Items without tags, which the retailer has an interest in monitoring;
- Items with tags, which the retailer has no interest in monitoring;

- Items with tags, which the retailer has an interest in monitoring.⁶

Over time, an increasing number of items will bear tags; an increasing percentage of tags will be more capable, and permit reprogramming, beyond “killing;” the retailer will have a capacity and interest in monitoring a larger percentage of the products on the shelves. “Over time” might constitute decades, however, given considerations of cost, and perceived value.

The three figures below capture the situation for a hypothetical store, over some indeterminate time (clearly dependent on the nature of the goods sold -- a retailer of luxury goods would look markedly different from a grocery store). Figure 1 would represent the present, where there are no tags placed on end-consumer goods by manufacturers. While none of the goods bear tags, the retailer may have an interest in monitoring some subset of the products (e.g., through use of tags attached by the retailer, to help prevent theft, etc.). Figure 2 describes the situation at some point in the future, where approximately a quarter of all of the items bear tags applied by the manufacturer -- in this case, an assumption is made that most of those items are also of interest to the retailer, for monitoring purposes (given that these are likely to be the more expensive/interesting items, not an unreasonable assumption). By Figure 3, tags have achieved even greater penetration, and the store has become more sophisticated in the use of tools to monitor items.

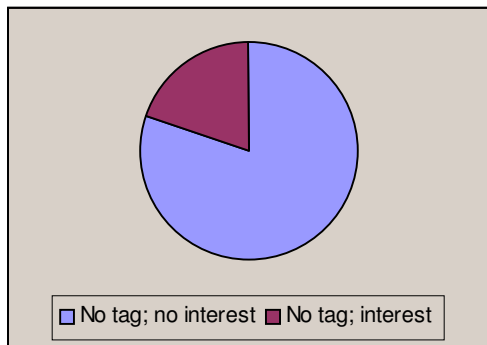


Figure 1

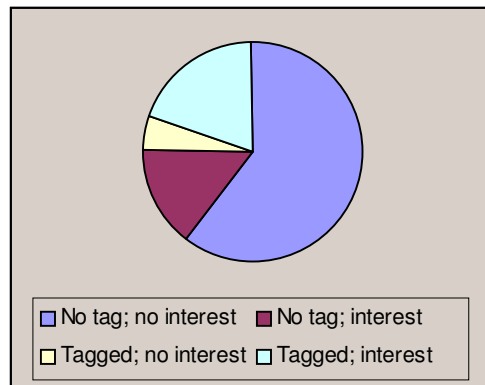


Figure 2

⁶ One could also imagine a fifth category: items surreptitiously tagged by some other party, i.e., items which are tagged, unbeknownst to the retailer. This might constitute a rather exotic form of competitive espionage, and is mentioned here merely to explore all (if perhaps remote) possibilities.

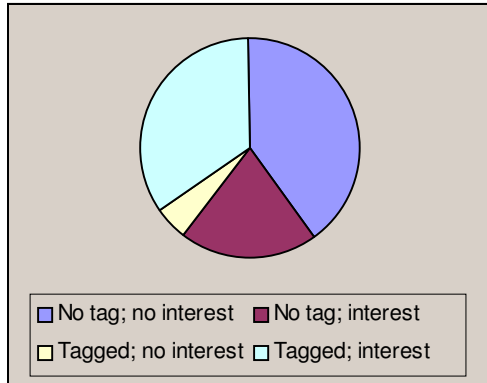


Figure 3

The relative sizes of the categories are largely speculative, but may fit a particular retailer, with a fairly strong interest in monitoring product on the shelves.

In the three stages of this scenario, there is a potential for “outsider” interest in information from tagged items; that interest might extend to both categories of tagged items (those of interest, and those not of interest, to the retailer).

As discussed at greater length below (regarding a “recoding” strategy), the retailer could consider (1) suppressing potential collection, by pre-emptive killing of any tag on an item not of interest in its own monitoring; and (2) making use of retailer-applied tags, on products not tagged by the manufacturer.

Qui Bono?

Cursory analysis suggests that retailers may see *fewer* benefits from adoption of RFID at the product level than other parties.

It would seem plausible that the value of EPC RFIDs at the actual point of sale will be very low, until and unless there is effective ubiquity of EPC tagging of products. All of the information required to easily record and charge for a purchase will be present in the “legacy” product code (UPC, ISBN, etc.); most stores, and most consumers, will have little interest in a record of the item’s unique serial (an element of the EPC, but not provided in the UPC). It may be that manufacturers will also be providing a print rendition of the EPC, whether or not they ever intend to encode it in an RFID tag.⁷

Accommodating consumers’ concerns regarding surveillance post-purchase will fall on the retailer: “You are selling me this [razor/CD/widget], you must kill its RFID.” At this point, and largely as speculation of the potential for end-consumer surveillance, a few small but vocal consumer advocacy groups have been lobbying for RFIDs on products to

⁷ The most obvious reason for doing so is to accommodate the situation where a tag is destroyed or disabled.

be easily (if not always) killed at point of sale. These would include Consumers Against Supermarket Privacy Invasion and Numbering (CASPIAN), and the Electronic Frontier Foundation (EFF); the latter's position on RFID tags on consumer products, in testimony before a California Senate inquiry on RFID and privacy, is that they should be killed at point-of-sale, until such time as tags are fully capable of reflecting consumer desires for their management.⁸

NB: While most of the focus regarding RFIDs on products has been on the major manufacturers and retailers, whose buy-in would be necessary to achieve a "critical mass" of demand, a situation where point-of-sale killing of RFIDs was widely demanded would place a tremendous burden on myriad *small* retailers, many or most of whom would have no interest in RFID themselves, and presumably little or no capability to kill tags. It is also difficult to envision a scenario where tags may be readily killed even by "mom & pop" retailers, yet are sufficiently secure against disabling by shoplifters.

Dead Tags Tell No Tales...

The value of preserving tags in the store will be in part dependent on the demand for functioning post-purchase tags; depending on public opinion, this might be an expectation that RFIDs *not* persist, post-purchase. If there is strong consumer demand that RFIDs be killed at point of sale, there is an incentive for the retailer to kill each and every tag they don't themselves need, prior to moving the product onto shelves, and into situations where it might be monitored by others.

A Recoding Strategy

An ideal solution, as far as suppression of "leakage" of information (short of no RFID tags whatsoever) is use of store-specific tags, i.e., tags whose values are understandable only with access to the store's internal information systems.

Recoding RFIDs would include (1) reprogramming reprogrammable tags with "store internal" values mapped to the actual EPCs; (2) killing non-reprogrammable tags; (3) affixing tags with "store internal" values to items, either those whose tags were killed, or which have never borne RFID tags, where in-store monitoring is desired. The first action could be performed at any of several points, e.g., when stock is received, in inventory, on the shelves, etc., with minimal effort (assuming some RFID management infrastructure, i.e., a reader capable of rewriting tags) -- it could also be performed piecemeal, and over time: any time a store reader encounters a reprogrammable tag with an EPC, it can reprogram it to a store-internal value; the store's information systems would hold the two values (original EPC, and in-store assignment) as equivalent. If killing tags is required *by* point-of-sale, i.e., to address consumer privacy concerns, there is no reason it might not be done earlier, e.g., as stock is moved out to the shelves.

⁸ http://news.com.com/2100-1029_3-5065388.html, "Privacy advocates call for RFID regulation," August 18, 2003, and author's notes from the California Senate hearing.

Conclusions

Any developments in competitive intelligence based on RFID collection and analysis will depend on EPC's penetration into the retail sales environment; much of speculation above may be mooted by a slow adoption of consumer product tagging.

One over-arching hypothesis is that RFID on consumer packaged goods will largely be unuseful to most retailers for the foreseeable future; as a consequence, retailers might adopt a policy of 'killing' RFID tags prior to moving goods to the shelves, adding efficiency to killing tags (if required, post-sale), and lessening the risk of information 'leakage' to competitors.

The preceding analysis assumed some demand for competitive intelligence by others (e.g., by competing retailers, or by manufacturers attempting to gain insights into their products' markets without reliance on reporting by the retailers), exactly what demand will arise will depend on many factors, including both technical, and legal.