

MIT and IESE Study Shows RFID's Value

In a study involving Wal-Mart, Gillette and Kimberly-Clark, researchers find real financial benefits to deploying RFID EPC technology.

By Claire Swedberg

May 1, 2006—A new study conducted by the Massachusetts Institute of Technology (MIT) and the University of Navarra's IESE Business School, in collaboration with Wal-Mart, Gillette and Kimberly-Clark, asserts that real financial gains can be achieved from using EPC RFID technology in the retail market. MIT and IESE presented the study, based on six months of research, as two vignettes (scenarios): electronic proof of delivery (EPOD) of products and the use of RFID to track retail promotions.

For each vignette, MIT and IESE investigated how passive UHF EPC RFID systems were used by participating companies. "This study is based on data from real implementations, not estimates," says Brian Subirana, lead researcher for the study, associate professor of information systems at IESE and visiting associate professor at MIT Auto-ID Laboratory. Subirana explains that the study investigated EPC systems already in use by such companies.

The EPOD scenario included tens of thousands of tags, Subirana says, and thousands of line items (lines of an invoice usually corresponding to shipments of one SKU). According to Subirana, the message both vignettes delivers is that "when you factor everything, RFID allows you to capture value today, even without a full deployment of the RFID infrastructure." In the case of EPOD, the study showed, RFID allows that capture of direct value by improving accuracy and eliminating or resolving discrepancies between the supplier and the retailer.

The EPOD vignette examined the receipt of product, the counting of product received and the matching of what was received with what was invoiced, all using RFID technology. Wal-Mart, Kimberly Clark and Gillette participated in the study, illustrating how RFID technology worked with Wal-Mart's receipt of products from Kimberly Clark and Gillette.

The basic principle behind EPOD is simple: When a manufacturer receives an order from Wal-Mart, the supplier sends cases with passive EPC UHF tags attached, then reads the tags on the cases as they ship to create an advance shipping notice. When Wal-Mart's distribution center receives the shipments, it interrogates the case tags, generating an electronic proof of delivery.

The EPOD study found that benefits include identifying small inconsistencies between the quantity and type of goods Kimberly-Clark and Gillette said they shipped and the quantity and type of goods Wal-Mart reported receiving. Previously, such inconsistencies often went uninvestigated because of the cost versus benefit of manually tracing the inconsistency. By identifying inconsistencies that would otherwise be overlooked, companies can reduce the cost of lost or misrouted product and avoid over- and under-stocks down the supply chain.

The research found that the study participants were able not only to identify discrepancies as they happened in

the distribution center, but also to trace their source. The cost savings to Wal-Mart of utilizing EPC RFID technology to identify these discrepancies, according to the study, was at least \$.01 and \$.03 per case. The study did not identify an upper bound for the value, but researchers concluded that benefits from RFID adoption could be obtained even with imperfect read rates.

The second vignette showed how EPC RFID technology benefited those participating in retail promotions. In the case of promotions, delayed or premature product movement onto the sales floor can have a large impact on the retailer's success in selling the product.

For the study, Gillette and Wal-Mart applied passive EPC UHF tags to promotional displays, monitoring their movements through the supply chain, starting from the moment the displays left Gillette's distribution center and ending when Wal-Mart placed them on the sales floor in its store. Wal-Mart and Gillette read the RFID tags on promotional displays and cases of product, both at the distribution center and at the store, experiencing read rates for up to 97 to 100 percent of the total cases shipped.

With RFID technology, the companies determined whether promotional products were put on display in the store by the promotion date. They also checked if the products still remained in the Wal-Mart's DC or store backroom after the promotion date passed.

The study determined that the amount of product sold during a promotion can be increased by as much as 19 percent by improving execution and ensuring promotional product is available at the store when needed. Researchers also found EPC RFID technology benefits where they did not expect them, Subirana says, noting that the misidentification of product cases is one common human error that can be rectified with radio frequency identification. "RFID speeds up the process, increasing accuracy," he notes.

In high-volume warehouses, multiple crates often arrive that appear similar but contain different product. Without RFID technology, warehouse employees need to identify each crate manually and match it with the correct purchase order. In the case of mixed pallets—those containing cases of different products—this can be a time-consuming process with a high error rate.

The above vignettes, Subirana reports, show that to extract value immediately, one need not have an entire RFID system in place. "It is possible to apply the technology in a subset of your operations, but in full production mode," he says. "The important message is to try it." In many boardrooms, Subirana explains, RFID implementations are stopped because of the complexity of a full-scale implementation. Still, he believes these vignettes should inspire management to elucidate use cases worth the investment on a small-scale basis.

"EPOD and promotions may be a place to start, but certainly are not the only option," Subirana says. "I'd like to encourage people to try to take a careful look at their operations and subsequently test the technology in a quasi-life scenario. We have found that in doing so, you will certainly discover things about your operations that you did not know." He adds that, "EPC technology will act as a magnifying lens of your operations and most certainly reveal shocking areas of value that you did not anticipate. I feel that EPC RFID will behave like SMS technology, fax, the Internet, mobile communications or e-mail, where it was not until management tried them that an explosion of value was perceived."

The vignettes are now available publicly at the [MIT Auto-ID Lab's RFID Academic Convocation Web site](#), and at the [EPCglobal Web site](#).