

CASE STUDY: APPLICATIONS OF RFID IN RETAIL BUSINESS

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ABSTRACT

The objective of this paper is to describe the basic aspects of RFID technology and to summarize its implementation in two disparate retail businesses. The information on the two companies (Prada and Wal-Mart) is drawn from several resources, including trade journals, white papers, news articles and websites

Introduction

Among the earliest adopters of RFID (Radio Frequency Identification) in retailing are two industry leaders that occupy opposite end of the marketing spectrum: Wal-Mart, the king of big box retailing and Prada, a leading retailer in luxury apparel (Hines, 2003). These two retailers are pioneering innovative technologies that are yet to be totally embraced by the industry or consumers. Interestingly, Prada, who began individual RFID item tagging in its upscale New York Epicenter store in December, 2001, never took full advantage of RFID tagging to track goods within its store. Prada's aim was not to eliminate inefficiencies in the supply chain but to enhance the customer shopping experience. Whereas, Wal-Mart with its 90,000 SKUs (stock keeping units) focused more on the efficiency of its total supply chain (Hines, 2003). In this paper, the attributes, limitations and usefulness of RFID technology will be explored. This will be followed by a discussion of the experiences of Wal-Mart and Prada in their implementation of RFID.

What is RFID and why do we need it?

RFID or radio frequency identification refers to small electronic devices, i.e., a tiny chip, attached to or embedded in the barcode of a retail item. The device carries up to 2,000 bytes along with an antenna. RFID technology has been around for more than sixty years. In World War II, the British used RFID to identify incoming planes (Carlson, 2004). Some more recent

and possibly familiar uses are animal tracking tags, the anti-theft tags used on merchandise, E-Z Pass boxes that hang in cars and transmit data at toll stops and parking lots, and the transponders used on shipping containers, to name a few. Despite challenges such as lack of standards and its relatively high cost, RFID is poised to do the same thing that wireless technology accomplished a few years ago. Like wireless technology it is here to stay (Schwartz, 2003).

Based on past experience, technology acceptance by industry goes through various phases of “boom, bust and stabilization.” The barcode scanners took years to catch on, but ever since the first scan was made in 1974 on a pack of gum at a grocery store in Ohio, the technology has been successfully adopted by most retailers – and currently customers can personally scan their groceries or hardware in many stores in the US without much effort.

RFID technology takes this scanning process to the next level. For instance, the items don’t have to be read directly by a scanner since a radio signal works within a few feet of the scanner (up to 20 feet) (Carlson, 2004). For example, at the University of Nevada, Las Vegas, one can set a stack of books to be checked out on a black pad and they’re all scanned simultaneously (Smart, 2004).

The driving force to develop RFID technology, however, seems not to be coming from that type of application but is being spurred by supply chain challenges. According to Wal-Mart executives, supply chain inefficiencies are costing the company billions in lost sales, and the industry-wide loss is about 3.5% of the sales revenue. Traditional bar-coding though still effective in many environments, has many limitations: individual scans mean higher labor costs and the possibility of human errors, while RFID offers greater flexibility, more storage capacity, increased data collection and more accuracy (Phaneuf, 2004). However, since UPC (Universal Product Code) is a standard which is used through out the industry, the bar-coding will remain a complimentary technology to RFID for the foreseeable future.

Prada and its epicenter project(s)

Whereas many people are familiar with Wal-Mart, most have never heard of Prada. This Italian fashion company was founded in 1913 by Mario Prada as a quality leather goods business and subsequently became part his granddaughter’s, Miuccia Prada, inheritance. She expanded the business starting in 1985 with a high-priced black nylon bag (which became so popular it spawned a global industry of Prada counterfeit goods), and in 1989 she designed her first clothing collection and continued Prada’s rise to the pinnacle of the fashion industry (Wikipedia, 2006). To compare Prada to Wal-Mart is to compare the proverbial apples and oranges. Wal-Mart wields its purchasing power for just one purpose--to bring the lowest possible prices to its customers, whereas. Prada takes a decidedly consciously intellectual approach to fashion and the whole retail experience, which has been the basis for its groundbreaking experiment to “create a new retail experience for Prada customers.”

Even if Prada’s unusual experiment in retailing has perhaps created more buzz than profit, their use of RFID technology portends wider retail use, and industry watchers believe that RFID will have a major impact on retail. Prada just seems to be ahead of its time - pushing the envelope with its ultra-bold architecture and rather avant-garde approach to making clothing purchases:

“The projects span from research on shopping and new concepts for Prada as a brand to the creation of a series of stores in strategic locations throughout the world. Beyond restructuring the physical reality of Prada, its virtual presence is simultaneously expanded through extensive in-store technology projects and the creation of a website. The combination of these aspects allows for the building of an integrated service structure that enables Prada to provide a new sense of exclusivity, while also reinforcing the aura of the brand.... The new Prada Epicenters offer a diversification of the shopping experience: the commercial functions are overlaid with a series of experiential and spatial typologies that enrich and expand the territory of shopping. The Epicenter stores are a working experiment and provide a laboratory for new spatial relationships, materials, technology applications and service strategies.”(Prada Epicenter Projects, 2004)

Is it smart retailing?

Never before has there been such a technologically ethereal, new-age approach to shopping as the experience at Prada. RFID is used everywhere: a scanner automatically reads data on the tagged clothing, shoes and accessories, to provide instant information about sizes and colors and to also “upsell:” suggest additional items to coordinate with what the shopper is trying on. Sales associates use handheld scanners to track inventory and customer data such as size, purchase history, and style preferences. When a customer is ready to try on a garment, she enters a high-tech dressing room, hanging the garment in a “smart closet.” The dressing room itself is a clear glass room that turns opaque when the sales associate steps on a black button on the floor. The dressing room contains two Lucite boxes: one for shoes and purses and a long, narrow one for hanging garments. There is a thick, flat bronze ribbon embedded in the room: the RFID antennas (Robert, 2002). Every dress, handbag, and pair of shoes is tagged with Texas Instruments RFID Tag-it Smart Labels. Handheld readers are located all around the store for use by sales associates to readily find prices and other information. Video monitors show a design from conception to runway to store and provide in-depth information about color, cut, fabric and materials. Although “customer experience” is a cliché, Prada has tried - through technology and expensive architecture - to provide an unparalleled level of service and “experience.”

Another concept Prada employs is the convenience card, which may be used to shop anonymously or have the sales associate scan the RFID chip in it, which will identify the customer’s preferences. Prada wants to give its customers a superior level of service, and given the prices it charges, it can afford to provide it. The Epicenter Stores are, no doubt, a clever marketing strategy, with over \$40 million spent on the New York store alone. A substantial portion of this amount has gone into the deployment of RFID. “The ‘Wave,’ a half pipe-type structure, in the middle of the ground floor with its ramp does double duty as a shoe display during the day and a “stage” at night (Sokol, 2003). The unpredictability of the architecture is designed to keep the customer curious and exploratory; although Prada ultimately discovered that it also attracted gaggles of non-buying tourists. Undaunted by this and other problems, Prada has opened an Epicenter in Beverly Hills (Prada Epicenter Projects, 2003).

In deploying RFID technology, ROI (return on investment) was never a concern – all the decisions were about the seamless shopping experience of the customers. Prada claims they are firmly committed to future additional applications of RFID and their integration into the

company's IT systems. These Prada stores are more about sizzle than the bottom line, and their sales and revenue statistics bear this out. The company lost \$77.5 million in 2004 (Kaiser, 2005).

Not everything has performed well or as expected in the Prada operations. Susan Reda, a writer by profession, visited Prada's New York Epicenter store and reported that "most of the upscale retailer's much ballyhooed technology is either not working or nowhere to be found." (Reda, 2004). Despite the store being hailed as a harbinger of retail design to come, it is suffering from the experience of having rushed to install technology before it was tested and before its employees were trained to use it and the customers were ready to accept it. Also, it was reported that some of the technology used in the store wore out early, for example, a number of readers were no longer able to read the individual tags. The color-changing dressing rooms were also discontinued in the next generation Epicenter store, the Beverly Hills store, basically due to problems with the technology not working and leaving undressed shoppers publicly exposed (Reda, 2004).

Prada should be acknowledged as a forerunner in applying RFID to retailing. Before the Prada New York Epicenter, RFID technology was virtually unexplored by retailers, and now that the potential impact of it on retail is being realized, it is expected to revolutionize the way people shop. What Prada tried as a "retail experience" probably won't be tried again any time soon. For one, the tags they used cost close to one dollar each, but again, their aim was not to cut costs or thwart theft but to improve service (Prada Epicenter Projects, 2004). Prada did make many changes in the subsequent Epicenter stores they opened in Los Angeles and Tokyo, learning from the New York store pitfalls.

What RFID has done For Wal-Mart and vice versa

Expansion in the field of RFID has been on the Wal-Mart agenda for some time and their message has been consistent. Believing RFID technology could work with pallets and cases of goods, the big retailer has installed 14,000 pieces of hardware, run 230 miles of cable and is live with more than one hundred suppliers (Sullivan, 2005). Before issuing the mandate to their suppliers for compliance, Wal-Mart ran a pilot test February through September, 2005 in twenty-four stores. Twelve stores were outfitted with RFID readers/antennae at various locations, including receiving doors, sales floor doors and box crushers. The other twelve stores were control stores. For the study, they tracked 4,554 unique items representing merchandise from nearly every department and evaluated these products to determine which ones were likely candidates for tagging. The overall results of the test showed a 16% reduction in stock-outs and a 2/3 drop in replenishment times (Johnson, 2006). These results were accomplished by combining point-of-sale data with RFID information on stock in the back room, providing a pick list in real-time based on sales, saving time and labor. This application eliminated scanning the shelves to see what needed to be replenished and scanning cartons and cases arriving in the stock room. Wal-Mart is now moving rapidly to install RFID technology in all their stores

Wal-Mart's test shows how RFID can provide retailers with real-time inventory information. Prada considered extending the real-time inventory capabilities of their hand-held scanners by linking the retail floor with the stockroom but for never implemented it, partly because of the temperamental nature of the scanners.

Wal-Mart is expanding RFID technology into other operations. It is already working on tracking recalls and putting RFID onto warehouse forklifts, to name two additional projects (Sullivan, 2005).

Smart-shelf systems - too smart for our good?

Wal-Mart claimed it backed away from one of its projects, a planned trial with Gillette, because of priorities and not because of consumer backlash. The proposed “smart shelf” system was supposed to pick up data from chips embedded in individual Gillette products and alert store managers when shelves needed replenishing or when products might have been stolen - two important measures to retailers (Shim, 2003).

With the exception of Prada’s “experiment,” the Gillette project was seen by consumer privacy advocates as an aggressive move of RFID technology into consumer privacy. Whereas RFID is a great tool for inventory control and theft prevention, it has the unfortunate side affect of potentially snooping/spying on individuals. In other words, RFID tags can potentially track *you*: where you shop, what you buy, how often, how many. Privacy advocates are concerned that the personal information these tags gather could be broadcast to the wrong persons for wrong reasons and with potentially severe consequences. This argument against RFID was also leveled at other similar technologies such as credit cards, or store card where a customer could get some savings through a reward program by allowing his or her buying habits to be captured for marketing purposes. RFID tags take this concept to the next level, knowing what you are wearing and which brands you buy, and just about every purchase could be numbered, tracked and categorized. Should private companies have that much information about a consumer? If there is no public resistance, there will be nothing to stop retailers, the government or even criminals from tracking and monitoring anything.

The transition years

Companies are already thinking about how RFID tags on products can be used beyond purchasing - for example, how a tag on a shirt could tell a washing machine what water temperature and spin cycle to use. A market research report looked into the future application of RFID. The report covering the years from 2005 to 2015 contains some interesting predictions. IDTechEx projects very rapid growth in RFID, as noted in the following table:

Forecast for global sales of RFID tags in billions 2005-2015

Number (billions)	2005	2010	2015
Item	0.5	27.0	1,000.0
Pallet/case	0.4	30.0	35.0
Other	0.4	5.7	12.5
All categories total	1.5	62.7	1,047.5
-Source: IDTechEx			

Another study, by USA Strategies, suggests that major economic savings by the retail industry can be realized through improved changes in RFID chip manufacturing, which will in turn reduce costs and will encourage a faster adoption of RFID (White paper, 2005).

Conclusion

RFID is an emerging technology with many diverse applications. We reviewed the diffusion and extent of the technology's use in the coming decade and its impact on making the supply chain systems more efficient. As the world's largest retailer and the world's largest company, Wal-Mart will be at the forefront of this process. Yet, still companies such as Prada are the ones that bring to bear the new applications that are innovative, interesting and capture ones imagination.

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